



sustainable urbanisation

DEVELOPING AN INFORMAL SETTLEMENT
INTO A RESILIENT URBAN CENTRE IN ZANZIBAR, TANZANIA

MIIA SUOMELA

Master's Thesis in Architecture
Aalto University / Finland

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INTO A RESILIENT URBAN CENTRE IN ZANZIBAR, TANZANIA

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Master's Thesis

Aalto University School of Arts, Design and Architecture

Department of Architecture

Supervisor KARIN KROKFORS

Instructor HELENA SANDMAN

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*"To develop a world-wide accepted strategy
leading to sustainability of ecosystems against
human induced stresses will be one of the great
future tasks of [hu]mankind."*

— Paul J. Crutzen & Eugene F. Stoermer (2000)

abstract

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Human induced stress on the natural environment has strengthened significantly due to global population growth and rapid urbanisation. These developments have inflicted an environmental crisis which threatens the ecosystems that the human survival depends upon. While the population and cities continue to grow worldwide, most of the future growth is anticipated to occur in Africa. As the future world will be mostly urban, cities will be key to solving sustainability issues. This thesis takes Zanzibar in Tanzania as an example to study how urban design and planning can be utilised to support resilient development in cities and thus contribute to achieving global sustainability — to ensure human well-being within the limits of planet Earth.

This thesis comprises two parts: a theoretical part and a case study. The theoretical part is based on literature studies, which first present the developments and projections in global population growth and urbanisation and the emergence of informal settlements. Then, the problematic concept of sustainable development is investigated to find out how it should be redefined. The first part concludes by presenting the key concept of resilience. In a rapidly and unexpectedly changing world, resilience — the ability to adapt to change — is considered key to sustainability.

The case study is based on field work in spring 2019 in Zanzibar, Tanzania, where design probing, a workshop with school children, semi-structured interviews, and a set of field observation methods were utilised to build an understanding of the studied context. The case study presents the current and projected urban conditions in Zanzibar and analyses the conditions and existing plans in a neighbourhood called Chuini in Zanzibar Town. The case study aims at illustrating how to apply the theory presented in the first part in practice in Chuini, which is suffering from rapid urban sprawl that is encroaching on valuable agricultural land and water catchment and retention areas. The case study concludes by presenting a development framework for urban resilience. The application of the framework is illustrated in Chuini, where it is utilised to plan the transformation of the existing informal settlement into a resilient urban centre. The proposal for the development in Chuini includes three connecting networks, concepts for developing typical areas there, and tools to improve ecological and social resilience by urban design.

The main outcome of this thesis, the development framework for urban resilience, defines a planning hierarchy with three steps: first, the ecological components of the social-ecological system — system of humans and nature, in this case a city or a neighbourhood — are prioritised; secondly, social components are enhanced and connected; and thirdly, the system is complemented with economic components. Within this framework, six principles of resilience thinking are proposed to be applied in urban design and planning to improve resilience in cities.

This thesis provides tools for urban development in Zanzibar, but the proposed development framework for urban resilience is applicable across the world in urban design and planning. The resilience solutions exemplified in the case study area are also transferable to similar contexts with careful consideration. By utilising the development framework, urban designers can contribute to global sustainability through improving urban resilience, the ability of cities to adapt to change.

Keywords: resilience, environmental crisis, sustainability, sustainable development, urbanisation, urban design, urban planning, informal settlement, Zanzibar

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Ihmisen vahingollinen vaikutus luonnonympäristöön on voimistunut merkittävästi maailmanlaajuisen väestönkasvun ja kaupungistumisen myötä. Tämä kehitys on aiheuttanut ympäristökriisin, joka uhkaa ihmisen eloonjäämiselle välttämättömiä ekosysteemejä. Väestö ja kaupungit jatkavat kasvamistaan ympäri maailman, mutta suurin osa tulevasta kasvusta tapahtuu Afrikassa. Koska suurin osa ihmisistä asuu tulevaisuudessa urbaaneilla alueilla, kaupungit ovat avainasemassa, kun ratkaistaan kestävyteen liittyviä kysymyksiä. Tässä diplomityössä käytetään esimerkkinä Sansibaria Tansaniassa tutkittaessa, miten kaupunkisuunnittelulla voidaan tukea kaupunkien resilienttiä kehitystä ja siten edistää maailmanlaajuisia kestävyttä – ihmisen hyvinvointia maapallon kantokyvyn rajoissa.

Diplomityö koostuu kahdesta osasta: teoreettisesta osasta ja tapaustutkimuksesta. Teoreettinen osa perustuu kirjallisuuskatsaukseen, jossa esitellään ensin maailmanlaajuisen väestönkasvuun, kaupungistumiseen sekä epävirallisiin asuinalueisiin liittyvää kehitystä sekä ennusteita tulevasta. Tämän jälkeen tarkastellaan kestävään kehitykseen liittyvää problematiikkaa ja sitä, miten käsite tulisi määritellä uudelleen. Ensimmäisen osan lopuksi syvennytään työn keskeisimpään käsitteeseen resilienssiin. Nopeasti muuttuvassa maailmassa resilienssi – kyky sopeutua muutokseen – on keskeisessä roolissa pyrittäessä kohti kestävyttä.

Tapaustutkimus perustuu keväällä 2019 Sansibarilla tehtyyn kenttätööhön, jossa tutkittavaan alueeseen tutustuttiin osallistavien suunnittelumenetelmien ja kenttähavaintomenetelmien avulla. Tapaustutkimuksessa esitellään Sansibarin kaupunkikehitystä ja siinä tapahtuvaksi arvioituja muutoksia sekä analysoidaan aiempia suunnitelmia ja vallitsevia oloja Chuinin kaupunginosassa Zanzibar Townissa. Tapaustutkimuksen tavoitteena on havainnollistaa, miten ensimmäisen osan teoriaa voidaan soveltaa käytännössä Chuinissa, joka kärsii asutuksen hallitsemattomasta leviämisestä arvokkaille viljelysmaaille ja sadeveden imeytysalueille. Tapaustutkimuksen päätteeksi esitellään suunnittelun viitekehys resilientille kaupunkikehitykselle ja havainnollistetaan viitekehyksen käyttöä Chuinissa, missä tämänhetkisestä epävirallisesta asuinalueesta suunnitellaan resilientti kaupunkikeskus viitekehyksen avulla. Kehitysehdotus Chuiniin sisältää kolme toisiaan täydentävää verkostoa, konseptit erityyppisten alueiden kehittämiseen ja kaupunkisuunnittelun työkaluja ekologisen ja sosiaalisen resilienssin parantamiseen.

Diplomityön tärkein tulos, teoreettisen osan pohjalta kehitetty suunnittelun viitekehys resilientille kaupunkikehitykselle määrittelee hierarkian kolmelle suunnittelun osa-alueelle: ensin otetaan huomioon sosioekologisen (ihmisistä ja luonnonympäristöstä koostuvan) systeemin ekologiset osat; toiseksi yhdistetään ja kohennetaan sosiaalisia osatekijöitä; ja kolmanneksi täydennetään systeemiä taloudellisilla komponenteilla. Viitekehyksen sisällä jokaisella suunnittelun osa-alueella noudatetaan kuutta resilienssiajattelun periaatetta, jotka parantavat resilienssiä kaupungeissa.

Tämä diplomityö tarjoaa työkaluja kaupunkikehitykseen Sansibarilla, mutta esitettyä suunnittelun viitekehystä voi soveltaa kaupunkisuunnittelussa myös muualla maailmassa. Tapaustutkimuksen kohdealueelle esitettyjä suunnitteluratkaisuja voidaan hyödyntää vastaavissa olosuhteissa harkinnanvaraisesti. Käyttämällä tässä työssä esitettyä viitekehystä kaupunkisuunnittelijat voivat edistää maailmanlaajuisia kestävyttä parantamalla kaupunkien resilienssiä, kykyä sopeutua muutoksiin.

Avainsanat: resilienssi, ympäristökriisi, kestävyys, kestävä kehitys, kaupungistuminen, kaupunkisuunnittelu, epävirallinen asuinalue, Sansibar

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foreword

When I was 15, I was asked how I would define equality. I do not remember the exact phrasing, but my idea was that each human being in the world is equally valuable as any other. My concern for global inequality finally led me to study development studies among other subjects in the University of Helsinki. There, the traditional ways of doing development co-operation were challenged, and participation of the local communities was emphasised.

In search for more concrete tools to tackle global inequality, I started studying architecture. During my studies in Aalto University, my journey has taken me to Nepal where we dealt with water issues with an interdisciplinary team. My path then took me to Ghana to the rural village of Abetenim to take part in an earth architecture workshop. And finally, my path led me through a thick forest of mangroves in Zanzibar, where I tried to supply some tools for the local department of planning to save vital ecosystems to protect the flooding city.

Through all these projects I have been pondering on the question I posed in my bachelor's thesis in architecture: in the globalised world of today, what is the role of a western architect in developing countries. Will we just spread Western culture and values wherever we go? Or is there a way to work in harmony with the foreign culture, only providing our professional skills to those in need, to genuinely work in collaboration with the local experts and communities? And especially today when we are facing a huge environmental crisis, is our handprint big enough to justify the environmental footprint of travelling around the world doing our projects and research?

In this master's thesis I continue with these themes and thoughts returning to Zanzibar, which faces intertwined environmental challenges due to population growth, urbanisation, and climate change. Based on an extensive literature review, and in close collaboration with the local Department of Urban and Rural Planning, various stakeholders, and school children and inhabitants in the case study area, I intend to propose an ecologically and socially resilient urban centre in the fast-growing area of Chuini in Zanzibar Town, Tanzania. With my thesis I hope to deliver my contribution in the discussion of the paramount importance of ecological sustainability in our time to ensure equal opportunity for everybody in the world to strive for a better future.

In Espoo, Finland

August 26, 2019

Miia Suomela



INTRODUCTION

"We have economists who model 'the economy', sociologists who explain how and why human communities behave as they do, and scientists who attempt to unravel the biophysical nature of ecosystems. They all generate powerful insights into how the world works; but these insights are partial. They are only on components of the system rather than the system as a whole."

— Brian Walker & David Salt (2006, p. 32)

Children in their school uniforms in Chuini, Zanzibar Town.

Urbanising world with limited resources

By 2050, it is estimated that there will be almost ten billion people in the world, and almost two thirds of them will be living in urban areas (UN Population Division, 2017). The trends of rapid population growth coupled with increasing urbanisation are especially prominent in Africa — from 2017 to 2050, more than half of the expected population growth is anticipated to occur there (UN Population Division, 2017) and almost 90 % of the future urban growth is projected to happen in Africa and Asia (United Nations, 2018d).

In many cities across the world, population shift from rural to urban areas has led to the emergence of informal settlements, in many cases slums. According to a report by UN Habitat (2015), informal settlements have become a global urban phenomenon, especially present in cities of the developing world. Zanzibar Town in Tanzania is one example of a rapidly growing city, where fast population growth and urbanisation have manifested in urban sprawl and the emergence of informal settlements all over the city. There are currently approximately 1.5 million people living in Zanzibar, a little less than half of them in Zanzibar Town. By 2035, the population of Zanzibar is projected to grow to 2.2 million, and Zanzibar Town is projected to host 1.25 million inhabitants (DoURP, 2014, p. 10).

The rapid population growth of recent decades and the related increase in consumption of natural resources have put an immense strain on the ecological capacity of planet Earth. Climate is becoming more unstable, extreme weather events are becoming more common, marine fisheries and tropical coral reef systems are collapsing, and ice sheets are melting causing sea levels to rise (Rockström, 2015). Zanzibar suffers the adverse effects of climate change already today as precipitation patterns are changing and temperatures are rising in the tropical climate. In addition, urban sprawl has encroached on valuable water retention areas, causing flooding, which will be exacerbated by the future intensification of heavy rains. These developments coupled with the rapid urbanisation call for solutions to develop Zanzibar Town in a sustainable way, and particularly for measures to protect the ecologically vulnerable and valuable areas from urban sprawl by densifying the urban structure.

The global challenges of population growth and urbanisation, and the environmental change ignited by the industrial revolution at the turn of the 19th century have been addressed since the end of the 1980s through the concept of sustainable development. It has been proposed as the solution to guide human development on this planet of limited resources. Sustainable development is currently widely considered as interdependent pillars of economic and social development and environmental protection (Sachs, 2015, p. 5). One could argue, however, that despite the good intentions of sustainable development, the past decades have actually witnessed what would better be called unsustainable development.



Image 1. Storm approaching Stone Town in Zanzibar.

The difficulties with the concept of sustainable development were addressed already in the 1980s by oncologist Karl-Henrik Robèrt (2002). According to him, part of the problem is that since its establishment, the definition of sustainable development has been tweaked by each player that has employed it in their operations, be it business, policy making or non-governmental activities. By defining sustainable development to match their purposes, each player has created rules of their own for the game. Consequently, the common goal has obscured, and most often become a series of separate goals. (Ibid.) The most recent attempt at defining common goals for humanity were the Sustainable Development Goals (SDGs) adopted in 2015 (United Nations, 2018b). However, they have encountered the same criticism as sustainable development in general: they do not offer clear, measurable targets (Stokstad, 2015).

A recent report by Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019) states that ecosystems around the world are deteriorating at an unprec-

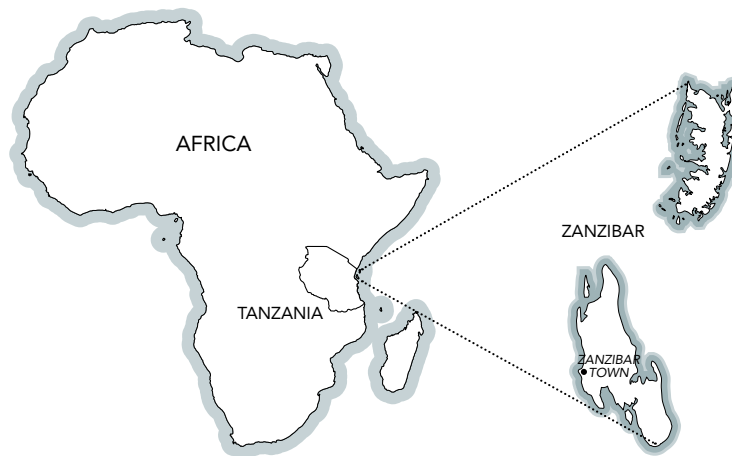
edented pace and the rate of species extinction is accelerating. The IPBES Chair, Sir Robert Watson, calls for “a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values” (Ibid.). This systemic change must be initiated urgently to halt global warming and the sixth mass extinction and to end the exploitation of the planet’s limited natural resources.

To be able to shift from the unsustainable development of today, sustainability must be redefined to truly respect the capacity of planet Earth. Professor Johan Rockström (2015) urges that human development be reconnected to the biosphere, on which the survival of humanity depends. According to this new definition of sustainability, instead of considering the economy, the human society and the natural environment as interdependent pillars, economy is seen as part of the social structures of humanity, which are undeniably dependent on the natural environment. This hierarchy is the core of this thesis and the precondition for being able to tackle the global challenges in a sustainable way.

Research frame and objective

As the world is becoming increasingly urban, cities will play a key role in solving the sustainability challenges of today and tomorrow. To be able to adapt to the challenges posed by the rapid population growth and urbanisation coupled with the environmental crisis, cities must improve their ability to adapt to change — to build their resilience. Resilience is widely defined as the capacity of a system, community, or society to resist and absorb disturbances, to adapt to change, and to transform and develop without losing its core characteristics (Stockholm Resilience Centre, 2015; Walker & Salt, 2006; UNISDR, 2017). Resilience in and of itself is neither a positive nor a negative quality: it can keep a system either in a desirable or undesirable state. However, resilience as flexibility to be prepared for unexpected disturbances and react in agile and creative ways to those disturbances, is seen as a positive quality. In this thesis, resilience is studied particularly from the ecological point of view because it is considered the precondition for social and economic considerations.

This thesis considers cities as social-ecological systems, systems of humans and nature, and resilience as key to achieving sustainability in these systems as proposed by Walker and Salt (2006). Due to the vital role of cities in this equation, urban design and planning are considered essential means to improve ecological and social resilience in urban areas. However, I argue that architects and urban designers cannot alone tackle the challenges the humanity is facing today, which is why I have chosen an interdisciplinary approach in this thesis combining theories from social sciences, sustainability science, and urban design and planning. This approach helps in understanding the complexity of the challenges but also helps in finding solutions to them. When the environmental crisis is accepted as the urgent challenge that it is, urban designers can and should play a significant role in building a more sustainable world.



This thesis aims to find ways of responding to the rapid population growth and urbanisation without undermining nature's capacity to maintain life supporting systems. These themes are studied on two scales: first, more theoretically on a global scale, and then, more practically on a local scale in the context of Zanzibar in Tanzania. In the case study I seek to answer to the following research questions:

How can rapid urbanisation be managed in a sustainable way in Zanzibar?

What kind of urban design strategies support the resilient development of informal settlements in Zanzibar?

The objective of this thesis is to show how to apply the theory in practice by creating a planning framework for building urban resilience. The framework does not pretend to be an all-inclusive solution to building sustainable and resilient cities but offers viable strategies for urban design and planning across the world. I illustrate the application of the framework in the case study area, where urban design solutions transform an informal settlement into a resilient urban centre. Through the case study example, I propose strategies and solutions to support resilient development in cities. These solutions could be further transferred and adapted to other areas in Zanzibar and with careful consideration also in other similar contexts.

Research methods

The theoretical part of this thesis is based on literature studies covering three themes. First, I study population growth and urbanisation on a global scale, and how they have resulted in the emergence of informal settlements from a social science perspective. Secondly, I study the environmental crisis with sustainability science as a starting point and look into how the problematic concept of sustainable development has been utilised to address the complicated relationship between human beings and nature. And thirdly, I study resilience thinking, resilience as a concept, and how resilience can improve sustainability in cities.

The case study is based on three weeks of field work in Zanzibar, Tanzania. I wanted to find a case study area through which I could illustrate the juxtaposition of ecological sustainability and urbanisation and find solutions for their reconciliation. The Department of Urban and Rural Planning (DoURP) in Zanzibar proposed a neighbourhood called Chuini in Zanzibar Town for me to study, because Chuini is experiencing uncontrolled urban sprawl which is encroaching on valuable agricultural land. A master plan for the area proposes all farmland to be sacrificed for the construction of new residential areas. To find a more resilient and sustainable solution, in this thesis, I look for alternative patterns of development for the area independently of the master plan.

Field studies in Zanzibar

The field studies were planned and carried out in cooperation with the DoURP. My travels coincided with the field trip of the Interplay of Cultures studio in Aalto University, which provided opportunities for cooperation with the students in carrying out the field work. Appendix II presents the itinerary of the field trip in detail.

General understanding of the case study area in Chuini was gained through field observations, and more specific information was collected by utilising a set of methods to engage the local community in the design process. Broadening participation has been commended as one way of improving resilience in social-ecological systems (Simonsen, et al., 2015). Thus, to be able to develop a resilient urban centre in Chuini, it was crucial to engage the people living in the area, although the limited time of the field trip set some restrictions on possible methods. I chose design probing, workshop at a school, and semi-structured interviews as engagement methods to gain insight into the local expertise and to increase the sense of ownership for those who participated in the exercises.

Field observations

Jan Gehl and Birgitte Svarre (2013) propose a set of tools for studying public life, in other words the interactions between human beings and public space — how people use space in cities. Public life studies aim at bringing public life back to urban design and planning as an important planning dimension and thus encouraging the design of more people-friendly cities. Gehl and Svarre argue that cities are not just about buildings and infrastructure but essentially about the life between buildings. (Ibid.) In this thesis it is of particular importance to study people's utilisation of public space, because behaviour is intricately connected to culture and I am working in a culture that is foreign to me. I chose counting, mapping, and photographing as the most suitable methods to help gather a comprehensive picture of the case study area. According to Gehl and Svarre (Ibid.), counting provides the possibility of comparisons over times or between different areas, mapping helps to spot places of interest and places for different activities, and photographing enables the documentation of various interactions in the public space.



Image 2. Public life at twilight in a busy crossing in Chuini, Zanzibar Town.

Design probing

To involve the inhabitants of Chuini in the design process, I chose design probing as the method of engagement. Participatory design researcher Tuuli Mattelmäki (2006, p. 39) describes design probes as “an approach of user-centred design for understanding human phenomena and exploring design opportunities”. In design probing, a chosen stakeholder group participates in the design process by means of self-documentation with as little disruption and interference as possible. Participants are encouraged to express their thoughts, ideas, feelings, needs, and values through a collection of assignments. According to Mattelmäki, probes are particularly meant for exploring new opportunities instead of solving existing, known problems. “The openness and room for interpretation also involve the expectation of a surprising or unexpected result”, Mattelmäki writes. (Ibid., pp. 40–43.)

Psychologist Bill Gaver and colleagues (2004), who created the original Cultural Probes, argue that the probes are not meant to gather specific information, but to get inspiration and an understanding of the participants’ life through their inputs. According to them, the probes are about valuing uncertainty and embracing that knowledge has limits (Ibid.). Following the proposition of Gaver and colleagues, I designed my probes to gather inspiration rather than specific information. I assembled a simple probe kit to gain an understanding of the experiences and thoughts the people living in the case study area had of their environment. We delivered 15 probe kits to families in Chuini with the help of the local *sheha* (head of *shehia*, the smallest administrative unit in Zanzibar) and a research assistant from DoURP and received 10 kits back.

The aim of the probing was to identify what kind of associations a set of colours, words and pictures would awaken in the minds of the participants. Through these associations I wanted to better understand how the local community perceives their environment and current conditions and what kind of aspirations they might have. Finally, I wanted to take advantage of these sparks of thoughts as inspiration in the design process.

Workshop with secondary school children

To engage children in the design process, we arranged a workshop in a secondary school in Chuini with two students from the Interplay of Cultures studio. We found it important to give a voice to the children as the future users of the city. We had two Zanzibari translators to help facilitate the workshop and the principal of the school chose nine girls and ten boys aged 10–14 to participate in the workshop. We divided the students into two groups and gave them four tasks in total. The first two tasks handled preferences of city spaces through asking the children to choose their favourites among a set of images of varying cityscapes and urban activities. The latter two tasks were drawing exercises in which we wanted to find out how the children perceive their environment. In the first drawing exercise the children drew their path from school to home and in the second exercise they drew their dream homes.

Semi-structured stakeholder interviews

To help me and the Interplay of Cultures students make the most of local expertise, DoURP arranged seven interviews during the field trip. The interviewees represented different government offices and non-governmental organisations and were chosen by the Director of the DoURP. Each interview lasted approximately for one hour and was semi-structured in nature. We did most of the interviews together with the students of the Interplay of Cultures studio. We always asked the interviewees to first tell freely about their general activities and then asked them more specific questions related to housing, urban design and planning, environmental issues such as climate change impacts, waste management, water management, and flooding, and social issues such as gender aspects, religion, accessibility, and equality. We prepared some questions beforehand specifically for each interviewee and their field of expertise, but most often questions arose spontaneously from the discussions. The interviews were a major source of information for building a comprehensive image of the planning context.

Thesis structure

The theoretical part of this thesis is divided into three chapters. Chapter 1 sheds light on the current global trends of population growth and urbanisation, presenting the underlying challenge of the whole thesis — emphasising why this thesis is relevant and topical. Chapter 2 introduces the concept of sustainable development and an alternative way of approaching sustainability as a global goal. Chapter 3 presents the concept of resilience and the application of resilience thinking in urban design and planning as the means to achieve global sustainability.

The case study is also divided into three chapters presenting a challenge, a goal, and the means to tackle them. Chapter 4 illustrates the case study context by presenting the trends of population growth and urbanisation and the challenges of urban sprawl resulting in informal settlements and environmental change in Zanzibar. Chapter 5 presents the site analysis of Chuini in Zanzibar Town based on existing planning documents produced by DoURP and the utilised field observation methods. The chapter also presents the results of the inhabitant and stakeholder engagement carried out during the field trip and brings up the question of assessing the environmental impact of this kind of research. Chapter 6 completes the case study by presenting the development framework for urban resilience and its application in the context of Chuini. The design proposal for Chuini comprises three connecting networks, consisting of ecological, social, and economic nodes which are further illustrated in conceptual plans and sections. The chapter also offers some concrete tools to improve urban resilience.

The thesis concludes in a discussion, where I first present the lessons learned in this thesis, bringing together the theoretical part and the case study. These discussions are followed by proposals for further research and actions to be taken in Zanzibar.

PART I

theory

chapter 1

The Challenge: Population Growth and Urbanisation

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chapter 2

The Goal: Global Sustainability

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chapter 3

The Means: Improving Resilience with Urban Design

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chapter 1

THE CHALLENGE: POPULATION GROWTH AND URBANISATION

*“This is the essence of the agricultural revolution:
the ability to keep more people alive under worse
conditions.”*

— Yuval Noah Harari (2017, p. 102)

Corrugated metal rooftops in the informal settlement of Ng'ambo, Zanzibar Town.

About 10,000 years ago there was a radical change in the life of the then hunter-gatherers: historian Yuval Noah Harari (2017) tells the story of *homo sapiens* who started to invest almost all their time and energy into controlling the growth of a few plant and animal species. This development, known as agricultural revolution, led to the emergence of permanent settlements which later grew into cities and made possible the exponential growth in human population (Ibid.).

This chapter studies the global challenges of population growth and rapidly increasing urbanisation. These trends have significant implications in cities, one of the most prominent being the emergence of informal settlements across the world, particularly in developing countries.

1.1 Growing world population

Human population on planet Earth has been growing steadily since the agricultural revolution. Since the 1950s, however, there is a drastic change in the growth as demonstrated in Figure 1. Development researcher Maaria Seppänen and colleagues (2007, p. 151) consider the number, structure and change of population possibly the most essential factor in economic and societal development. They state that population is either seen as the force that drives development or one that depletes the products of development. Thomas Malthus had expressed his concern for the sufficiency of food in the world already in his famous essay in 1798 where he estimated that the exponentially growing population would exhaust the linearly growing food reserve and cause famine and human plight (Ibid., p. 164). Malthus's predictions did not fully realise, but at the turn of the 1970s, when the limits of natural resources finally dawned on humankind, the population in the developing countries was growing fast — so fast that the term 'population explosion' was popularised. At the same time, the birth rate and the number of children per mother were criticised; they were seen either as the cause or the effect of poverty. (Ibid., p. 151.)

In the beginning of 2019, there were approximately 7.7 billion people living on planet Earth (World Population Review, 2019a). According to a UN report from 2017 (UN Population Division, 2017), 60 % of people live in Asia, 17 % in Africa, 10 % in Europe, 9 % in Latin America and the Caribbean, and the remaining 6 % in Northern America and Oceania. The report estimates that the world population is to reach 8.6 billion in 2030, 9.8 billion in 2050, and 11.2 billion in 2100. The upward trend is expected to continue even if fertility levels continue to decline, because of the considerable number of young people: a quarter of the world's population are under 15 years old. From 2017 to 2050, more than half of the expected population growth is anticipated to occur in Africa. (Ibid.)

Despite these projections, Seppänen and colleagues (2007, p. 155) state that the world population has irrevocably ceased to grow; although the total population keeps increasing, the population growth of today is purely maintained by the population growth of past decades. Birth rates (the number of children born per 1000 people in

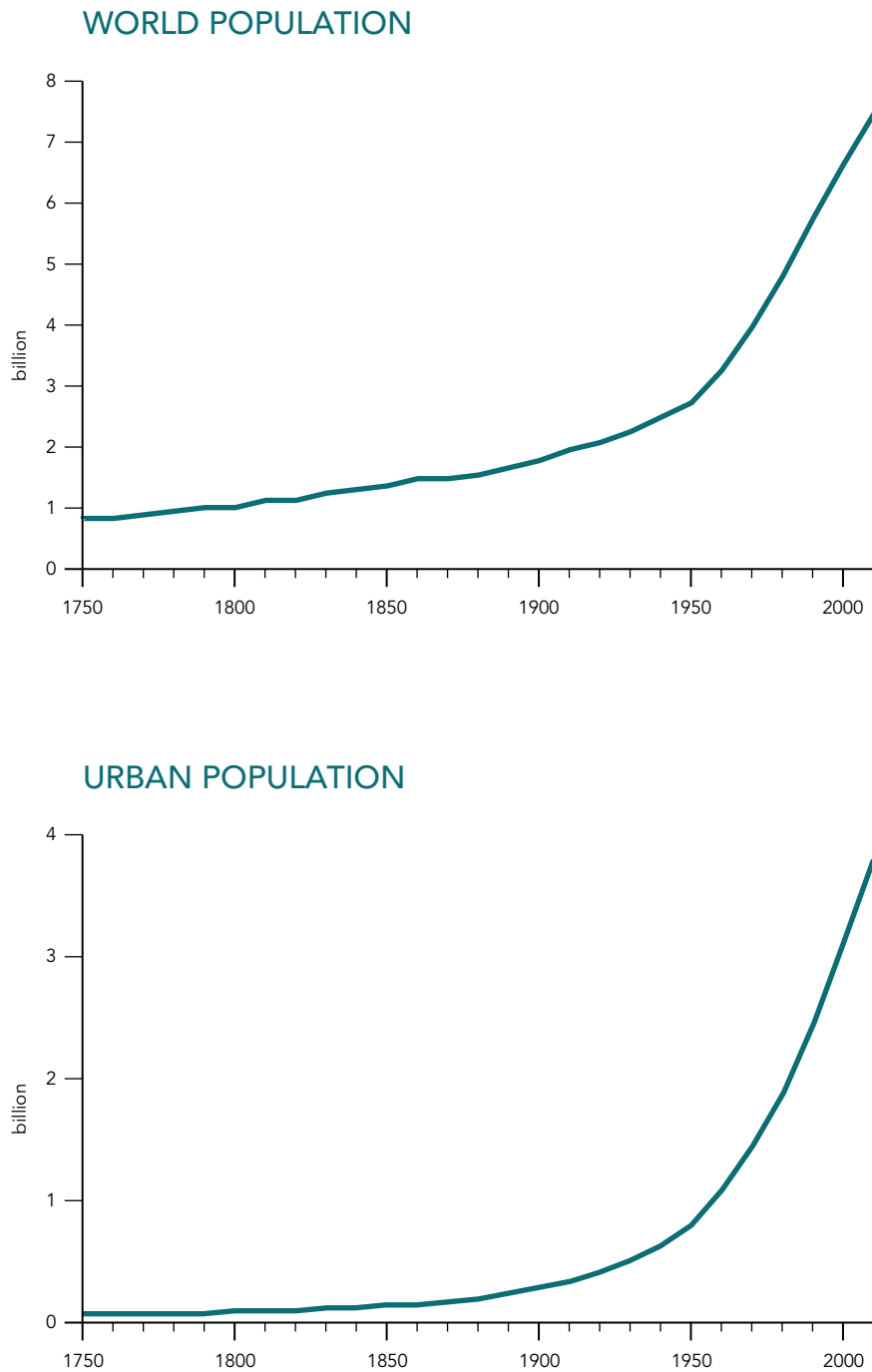


Figure 1. World population and urban population. Developments in total world population and population in urban areas from 1750 to 2010 show a growing trend since the 1950s. Based on Steffen, et al. (2015b).

a certain population) remain high, while total fertility rates (estimate of children per woman in a certain population) are declining (Ibid.). The statistics confirm this: the growth rate of the world population has decreased slightly from 1.24 per cent in 2007 to 1.1 per cent in 2017 (UN Population Division, 2017), and it continues to decrease.

The general increase in population has been coupled with an increase in urban population (Figure 1). The proportion of total population living in urban areas is increasing due to both general population growth and strong migration from rural to urban areas (United Nations, 2018d). This process is called urbanisation.

1.2 Increasing shift to urban areas

Agricultural revolution, about 10,000 years ago, was the first instigator of urbanisation. According to Harari (2017), the agricultural revolution was a revolution in the way the human species lived: people stopped roaming around after nourishment, and instead stayed in one place to nourish their fields and domesticated animals. He further explains that the surplus of food allowed some people to concentrate on other things besides food production which led to the emergence of new professions, division of labour, and cultural development. Around the once small permanent settlements grew later cities, but vast majority of human population remained in rural areas.

Cities are often characterised with a relatively high population density that is coupled with both economic activities like production and exchange, and activities related to secular and religious or spiritual exercise of power (Seppänen, 2007, p. 208). Industrial revolution, at the end of the 18th century, was the true agitator of urbanisation. In the beginning of the 19th century, only three per cent of the world population lived in cities (Ibid., p. 207), but during the century there was a strong shift from rural to urban areas in industrialising countries. The developing countries caught up on this development during the 20th century. According to United Nations data (UN Population Division, 2018), in the beginning of the 1950s, 30 % of the world's population lived in cities, but less than 15 % in Africa, for instance. In 2018, 55 % of the world's population lived in urban areas, but Africa remained mostly rural, with only 43 % of its population living in cities. In the data it is estimated that by 2050, 68 % of the world population is projected to be residing in urban areas. Remarkably, almost 90 % of the future urban growth is projected to happen in Africa and Asia (United Nations, 2018d).

Maaria Seppänen (2007, p. 217) presents one way of studying migration from rural to urban areas in which causes are classified into two kinds of factors: push factors and pull factors. Push factors are those that make people leave rural areas, push them away from there: poverty caused for example by poor agricultural productivity and lack of cultivated land, and lack of prospects, like scarcity of education opportunities. Pull factors are those that make people move to urban areas, pull them into the cities: especially opportunities for employment and education, but also other temptations and entertainment only available in cities. (Ibid.)



Image 3. Social housing blocks from the 1960s in Zanzibar Town centre.

Seppänen (2007, p. 218) introduces also another way of looking at the causes: classifying them in structural and subjective explanations. Structural reasons for migration might include the modernisation of agriculture, changes in the relations in production in rural areas, and industrialisation strategies that focus on cities. Subjective reasons are those that individuals themselves give for their migration, such as family reasons, education opportunities, or hopes of modernising their life. (Ibid.)

1.3 Emergence of informal settlements

The rapidly growing population and the urbanisation process have created an unprecedented demand on affordable housing and city infrastructure. According to a United Nations (2018c) report, urban land is currently expanding globally at a rate 1.5 times that of the urban population growth. In the report this urban sprawl is said to have made cities less dense and made more sustainable patterns of urban development challenging. In many countries, cities have grown at such a pace that governments have not been able to arrange housing, work, education, health care, or services like city infrastructure to the people that have moved in (Seppänen, 2007, p. 207), which has led to the emergence of informal settlements. Informal settlements have become a global urban phenomenon, especially present in cities of the developing world, but also found in developed countries (UN Habitat, 2015).

UN Habitat (2015) defines informal settlements as residential areas, where inhabitants have no security of tenure to the dwellings or land they reside in, where city infrastructure and basic services are lacking, and where the housing does not follow current building and planning regulations (Figure 2). UN Habitat indicates a variety of factors apart from population growth and rural-urban migration that have caused the rise of informal settlements. Among these are weak governance particularly in policy and planning, lack of affordable housing, underpaid work and economic vulnerability, marginalisation, discrimination, and displacement caused by climate change, natural disaster, and conflict. (Ibid.)

UN Habitat (2015) describe slums as the most deprived form of informal settlements often located in the most hazardous areas. In addition to the mentioned characteristics of informal settlements, slums lack structural quality and durability of dwellings, adequate living space, sufficient and affordable access to safe water, and access to adequate sanitation. People living in slums are constantly exposed to disease, violence, and eviction, and more prone to safety hazards such as fire. (Ibid.) It is important to note here that while slums fall under the category of informal settlements, not all informal settlements are as deprived as slums. The level of services and living conditions, and the quality and permanence of shelters vary significantly among informal settlements.

Improving the lives of at least 100 million slum dwellers was among the Millennium Development Goals (MDGs) defined and adopted by the United Nations (2015). The



INFORMAL SETTLEMENT

A residential area where

- ... inhabitants have no security of tenure vis-à-vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing
- ... the neighbourhoods usually lack, or are cut off from, basic services and city infrastructure
- ... the housing may not comply with current planning and building regulations, and is often situated in geographically and environmentally hazardous areas

Figure 2. Definition of an informal settlement by UN Habitat (2015). The image portrays housing in an informal settlement in Chuini, Zanzibar Town.



Image 4. *Unfinished cement block house in Chuini, Zanzibar Town.*

indicator used in the monitoring process was the proportion of urban population living in slums. The final report on the MDGs (Ibid.) notes that the target on slum dwellers was reached globally: between 2000 and 2015, 320 million people gained access to either improved sanitation or water, less crowded housing conditions, or durable housing. According to the report, the proportion of the developing countries' urban population living in slums declined from 46 % in 1990 to 39 % in 2000, and to 30 % in 2014. However, while the proportion is declining, the number of slum dwellers remains high at over 880 million (in 2014) and actually increased by some 200 million people from 1990 to 2014. The highest prevalence of slum conditions in the world in 2014 was in Sub-Saharan Africa. (Ibid.)

1.4 Conclusion

As the total human population on Earth continues to grow and the world simultaneously urbanises at an unprecedented rate, urgent measures are required to manage the situation in a sustainable way. Seppänen (2007, p. 229) says that “the growing cities of developing countries are both the worst-case scenario of uncontrolled societal development, and a promise of a better future to their inhabitants and outsiders alike”. The growth of slums and informal settlements is a development that needs to be halted and reversed to make the cities respond to the dreams and hopes of the people who have moved and keep moving there from the surrounding rural areas. Particularly in developing countries, where the challenges are the most severe, cities must be planned in a way that offers safe and affordable living conditions for all, prevents further urban sprawl from encroaching on valuable natural environments and agricultural lands, and ensures a harmonious existence for humans and nature.



chapter 2

THE GOAL: GLOBAL SUSTAINABILITY

“There is no doubt humans have been successful in modifying the planet to meet the demands of a rapidly growing population. But the gains achieved by this spectacular re-engineering have come at a price. It is now wide apparent and acknowledged that humanity’s use of the biosphere is not sustainable.”

— Stockholm Resilience Centre (2015)

Farmland and housing in Chuini, Zanzibar Town.

Human impact on the natural world has been significant since the onset of the industrial revolution, and population growth and urbanisation are not the only indicators of increasing human influence on the environment. Human enterprise has expanded to a point where the capacity of planet Earth is constantly being tried. Today, humanity stands on the brink of an ecocatastrophe and the only way forward is to find a truly sustainable way of living in harmony with nature.

This chapter sheds light on the extents of human impact on the environment through the concepts of the Great Acceleration and the Anthropocene. It discusses the shortcomings of the concept of sustainable development and endorses a new definition for sustainability as a goal for future development. Finally, the chapter questions the current definition of sustainable cities and proposes to make it compatible with the goal of sustainability.

2.1 From Holocene to Anthropocene

Since the 1950s, human activities have experienced a noteworthy change: the magnitude and the rate of change have accelerated dramatically. At the same time, drastic changes have been recorded in the natural world. In 2004, chemist Will Steffen and colleagues (2015b) introduced 12 indicators for human enterprise and 12 for features of the Earth System to study the human-driven changes to the Earth System. Biologist Kathy Hibbard and colleagues — including Will Steffen amongst others — (2006) first called the process illustrated by the indicators the Great Acceleration. There is a radical acceleration in the rate of change since the 1950s across all indicators, both the socio-economic and the Earth System trends. The indicators were updated in 2015 to show the most recent development and to differentiate the activity of the wealthy countries, the emerging economies, and the rest of the world, when data permit (Steffen, et al., 2015b). Figure 3 (see next spread) presents the updated graphs, which also point out that the share of the developing countries in most of the socio-economic indicators is small relative to their share of the population growth.

Primarily due to developments in industrialised countries, the humankind stands on the brink of an ecocatastrophe. The Earth System is in an alarming state: climate is becoming more unstable, extreme weather events are becoming more common, aquatic ecosystems are threatened by nutrient runoffs from fertilizers and other sources, marine fisheries and tropical coral reef systems are collapsing, ice sheets are melting, and methane is being released from sea beds (Rockström, 2015). Professor Johan Rockström (Ibid.) claims that “humanity has become the dominant force of change on Earth” — that we live in a new geological epoch, the Anthropocene.

*“We are doing a poor job of protecting
the physical basis of our very survival!”*

— Jeffrey Sachs (2015, p. 2)

The term ‘Anthropocene’ was first coined in 2000 by the atmospheric chemist Paul Crutzen, who has been awarded a Nobel Prize for his research on ozone depletion, and by biologist Eugene F. Stoermer. Crutzen and Stoermer (2000) propose the use of the term for the current geological epoch due to the major and still growing impacts of human activities on Earth and the atmosphere. According to them, the Anthropocene started in the late eighteenth century, when glacial ice cores show the beginning of growth in global concentrations of carbon dioxide and methane. Since then the human impact has increased on land, water, and air alike, and the exploitation of natural resources continues to accelerate. The start of the Anthropocene epoch would mark the end of the Holocene, the interglacial (warm) interval that began about 12 millennia ago, during which the activities of the humankind “gradually grew into a significant geological, morphological force”. (Ibid.) Steffen and colleagues (2015b) argue that from an Earth System science perspective, the beginning of the Anthropocene would be better justified at the beginning of the Great Acceleration in the 1950s.

Although not yet accepted as an official geological epoch by the scientific community of geologists, the term Anthropocene is currently widely in use both in science and in media to underline the human impact on the Earth System (Subcommission on Quaternary Stratigraphy, 2019). In 2018, the Anthropocene was used as a framing concept in the IPCC Special Report on Global Warming of 1.5 °C (Allen, et al., 2018). The Anthropocene is also adopted as the frame for this thesis. The development manifested in the Great Acceleration graphs is inherently unsustainable in the context of the limited resources on planet Earth. To halt the current trends there is an urgent need for redefining sustainability for human endeavours.

2.2 The unsustainability of sustainable development

The human population is still growing, but the resources to respond to the increasing demand are not. Maaria Seppänen and colleagues (2007) argue that the global ecological capacity does not depend on the number of people or the future population growth but rather on the level of consumption and the technologies used. This claim is supported by chemist Michael Braungart and architect William McDonough (2008, p. 79) who point out that the combined biomass of ants on planet Earth is greater than that of human beings. Braungart and McDonough underline that the ants’ impact on their environment is positive unlike that of the most human activities; when ants dig the earth, move minerals, and recycle the waste of other beings, they improve the growth environment for other living beings.

As illustrated in the Great Acceleration graphs, the world’s nations are unevenly responsible for the havoc the humankind has wreaked on the planet. World Wildlife Fund (Grooten & Almond, 2018) underlines that natural resources are unevenly distributed across the world, but resources are not always consumed at the point of extraction. To gain understanding of the true consumption patterns of the world, the concept of ecological footprint is used to calculate consumption per person. The variations in

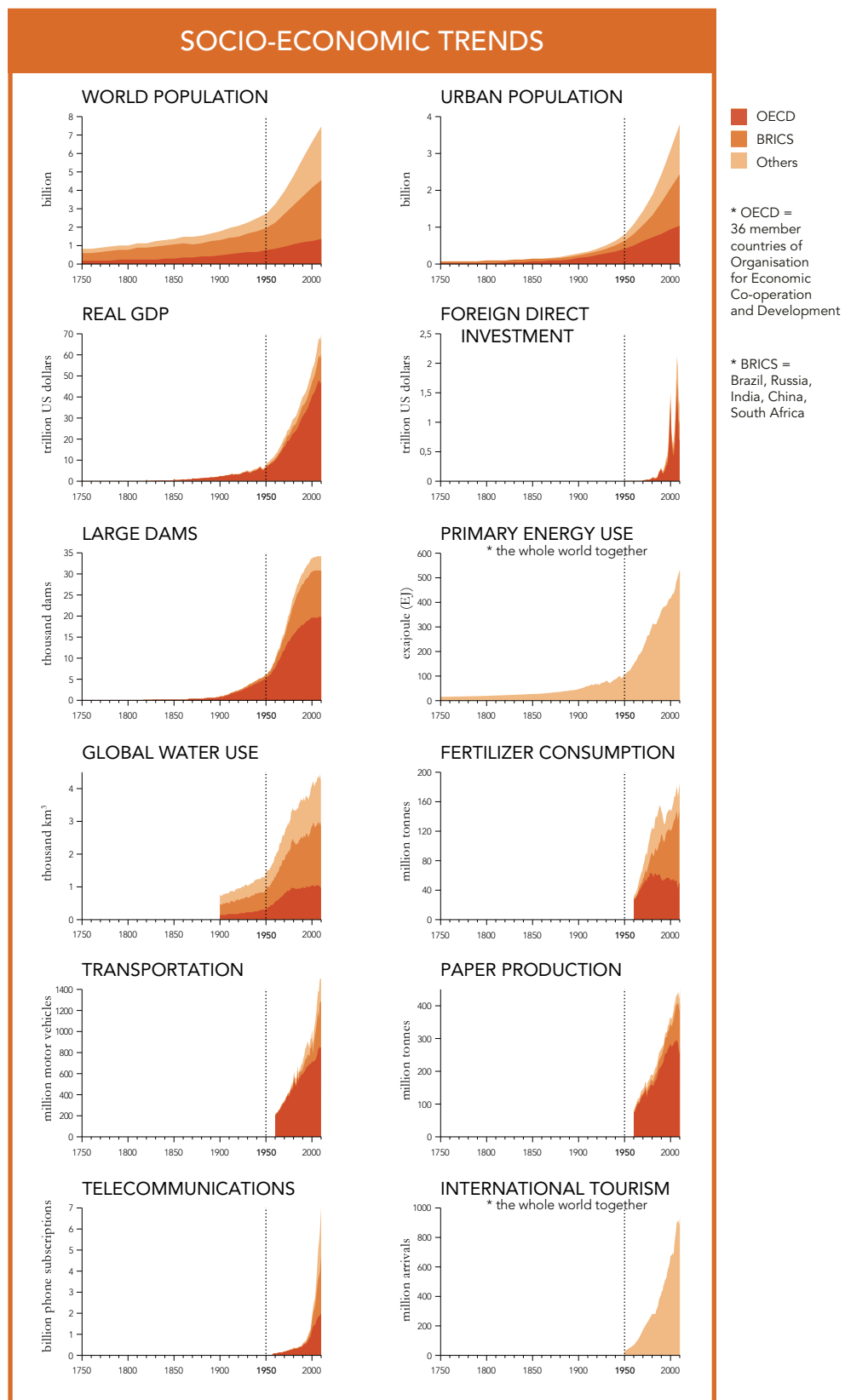
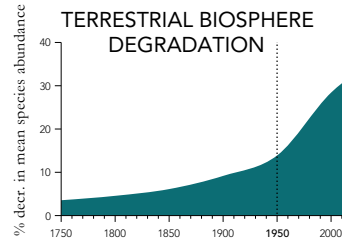
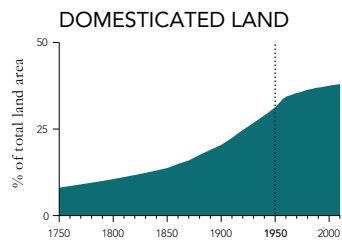
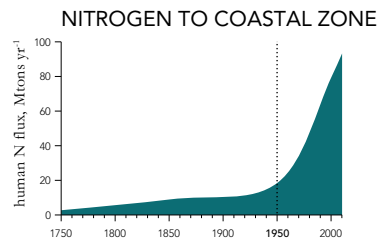
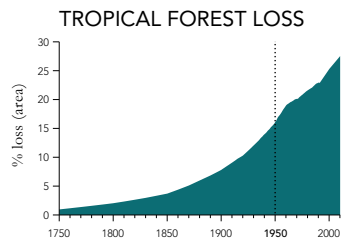
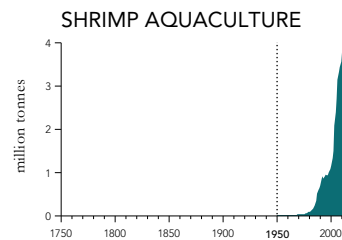
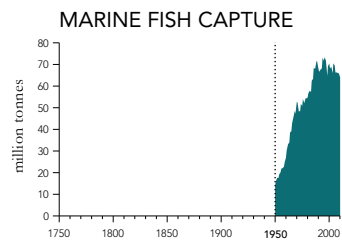
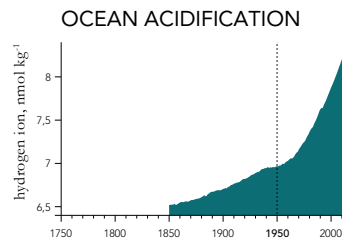
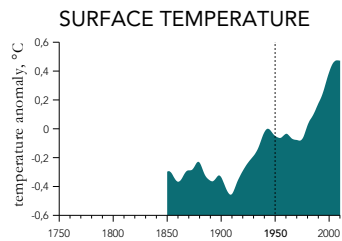
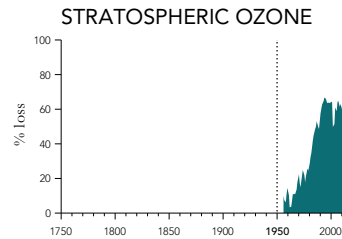
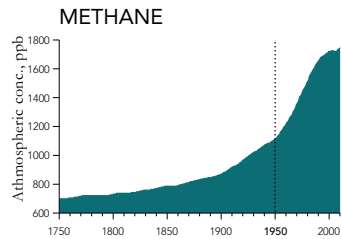
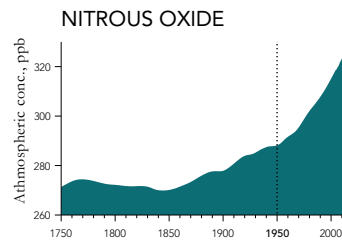
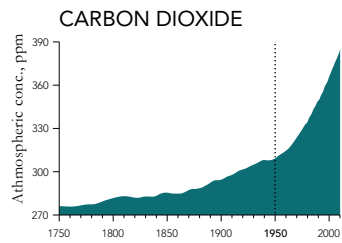


Figure 3. *The Great Acceleration. Developments in socio-economic and Earth System trends 1750–2010 follow similar patterns. Based on Steffen, et al. (2015b).*

EARTH SYSTEM TRENDS



size of the footprint of consumption follow roughly the equator, as illustrated in Figure 4, dividing the world to Global North with a large footprint and Global South with a small footprint (with a few outliers).

To understand the relationship between human activities and nature, and to guide those activities in such a way as not to totally deplete the natural resources, humans have tried to define and achieve what is called sustainable development. Oxford English Dictionary (Oxford University Press, 2019) defines sustainable development as “economic development in which natural resources are used in ways compatible with the long-term maintenance of these resources, and with the conservation of the environment”.

The United Nations has a long history in advocating sustainable development. The classic definition of sustainable development follows the Brundtland Report where it is described as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987). This intergenerational definition has evolved over time and currently a more comprehensive approach is supported (Sachs, 2015, p. 5) in which economic and social development and environmental protection are considered as “interdependent and mutually reinforcing pillars” of sustainable development (United Nations, 2002, p. 2). The

GLOBAL MAP OF ECOLOGICAL FOOTPRINT

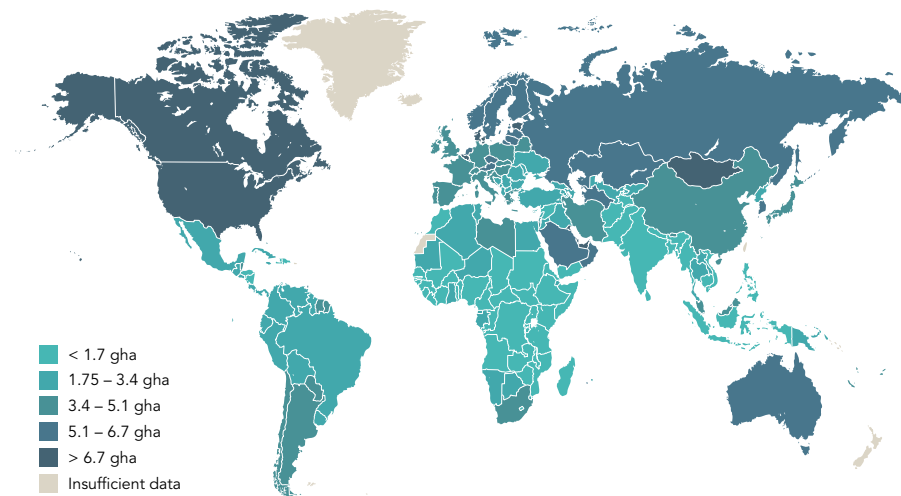


Figure 4. Global map of ecological footprint. The ecological footprint per person depicted in this world map divides a country's total ecological footprint by the total population of the country. The sustainable level of consumption is considered to be 1.7 global hectares (gha). The consumption includes the ecological footprint of production, plus imports from other countries, minus exports. (Global Footprint Network, 2018.)

three pillars of sustainable development — environment, society, and economy — are presented in the conventional diagram of overlapping circles in Figure 5. In this model, sustainability is achieved, when all three aspects are considered equally. A fourth pillar, culture, has also been proposed to address the importance of culture in human development and well-being (Golubchikov & Badyina, 2012; Sandman, Levänen & Savela, 2018), but in this thesis, culture is considered as an inherent and inseparable part of the social dimension.

In 2015, all United Nations member states adopted the 17 Sustainable Development Goals (SDGs), which are a continuation of the Millennium Development Goals (MDGs) (United Nations, 2018b). The SDGs aim at eradicating poverty, reducing inequality, improving health and education, and spurring economic growth while protecting the planet. All goals are set to be achieved by 2030. (Ibid.) Science reporter Erik Stokstad (2015) writes in an article that the SDGs have been criticised for being too vague and weak, and offering no measurable targets. The SDGs were created to complete the unfinished work of the Millennium Campaign. While the MDGs were commended for being concise and measurable — there were eight goals with only 18 targets — the SDGs contain 17 goals with 169 targets and some of the goals propose activities instead of endpoints to be achieved. According to the critics, vague goals will make it difficult to evaluate progress. (Ibid.)

SUSTAINABLE DEVELOPMENT

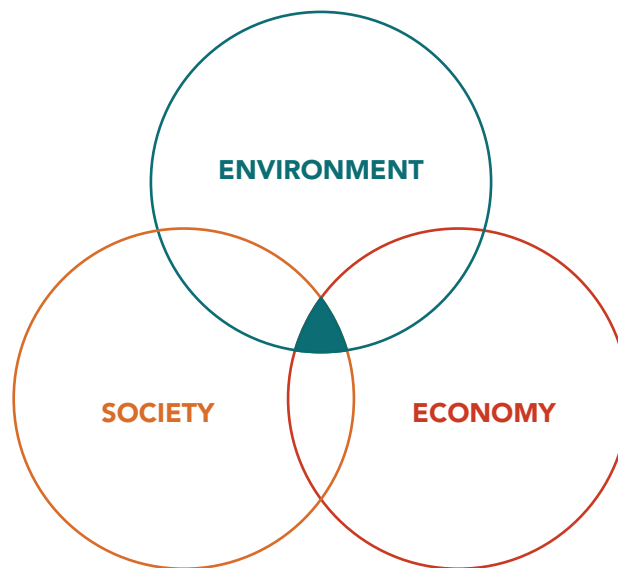


Figure 5. Sustainable development. The traditional components of sustainable development — environment, society, and economy. Sustainability is achieved in the middle, where all three components overlap.



Image 5. *Protecting the environment also contributes to protecting human well-being and livelihoods — the social and the economic realms respectively. Fishers on a beach in Chuini, Zanzibar Town.*

United Nations (2019) consider economic growth, social inclusion, and environmental protection as interconnected aspects of sustainable development that need to be addressed in harmony. Although the UN considers the environment a key component of sustainable development, they consider human well-being and development paramount and give priority to the needs of the world's poor. From the social perspective, equality of all human beings should be the primary goal, and to achieve this, eradication of poverty is unquestionably of major importance. However, from the point of view of planet Earth, human well-being is secondary. While human beings do depend on planet Earth, planet Earth is not dependent on human beings. Considering this fact and considering that sustainable development has been discussed and pursued for over three decades, it is striking how unsustainable human development has been in the past decades.

2.3 Towards a new definition of sustainability

In the face of the unprecedented human inflicted environmental crisis, sustainable development cannot any longer be defined with the priority of human interest. Seeing sustainable development as something that is achieved when ecological, social, and economic sustainability meet is no longer viable. Instead, sustainable development must be considered as social well-being and economic prosperity that are achieved within the limits of our environment. Next, this view is elaborated further.

The unsustainability of human endeavours has been addressed by several authors. Professor Johan Rockström (2015) claims that continuing the current trajectory will result in serious difficulties in fulfilling the needs of the future world population, that is, the opposite of the original goal of sustainable development. Scientists Brian Walker and David Salt (2006, p. 4–5) indicate three drivers for unsustainable development: having no choice due to poverty, allowing it to happen even if aware of the consequences, and misunderstanding how the world works. They emphasise that in communities coupled with poverty, overusing resources is a question of survival but in other contexts, resources are often allowed to decline, or they are even driven down on purpose, encouraged by subsidies, tax breaks, or industry support. They also note that sometimes ecosystems collapse despite the efforts of doing things in a ‘sustainable’ way due to lack of knowledge about the functioning and complexity of the ecosystems involved. (Ibid.)

Walker and Salt (2006, p. xiii) argue that the most general response to diminishing natural resources has been using the same methods that brought on the alarming state of the environment: “more control, more intensification, and greater efficiency”. Scientist Michael Braungart and architect William McDonough (2008) have proposed the concepts of eco-efficiency and eco-effectiveness to understand this twisted relationship between social and ecological systems.

According to Braungart and McDonough (2008, p. 51–53), the term eco-efficiency was coined by the Business Council for Sustainable Development, a group of industrial sponsors who were asked to provide business insight to the United Nations’ Earth Summit in Rio de Janeiro in 1992. They defined eco-efficiency as a pursuit of doing more with less, using fewer resources, and producing less waste and pollution. Braungart and McDonough see this pursuit twining around reducing, reusing, and recycling — the famous three Rs. (Ibid.)

Braungart and McDonough (2008, p. 62) point out the same issue as Walker and Salt: the problem with eco-efficiency is that it “works within the same system that caused the problem in the first place”. They see eco-efficiency merely slowing down the process of depleting the finite resources and destructing the unique environment of planet Earth. Therefore, they question whether efficiency is any good in a largely destructive system (Ibid., p. 63).

Braungart and McDonough (2008) present eco-effectiveness as an alternative for eco-efficiency. Instead of making the existing destructive system more efficient, they

propose imitating nature's cradle-to-cradle system. In nature, waste does not exist but is always raw material, or "food", to something else. Planet Earth is a closed system, where "whatever humans make does not go 'away'". Thus, human activities should utilise and produce solely biodegradable materials that feed biological cycles or technical materials that stay in closed-loop technical cycles circulating nutrients for industry. (Ibid., p. 103–104.)

Oncologist Karl-Henrik Robèrt (2002) has acknowledged the inconsistency between human activities and the natural environment by founding The Natural Step -organisation to define sustainability in an exhaustive way that would be shared by everybody as a common goal. The framework is based on systems thinking: solving problems on a system level instead of a detail level. The Natural Step Framework gives four system conditions for a sustainable society (Ibid., p. 65–66.). The first and the second condition concern substances that the biosphere is unfamiliar with and thus unable to process: in a sustainable society, nature is not subject to increasing amounts of substances extracted from the Earth's crust nor substances produced by technical processes. The third condition states that in a sustainable society, physical degradation of nature is avoided by drawing resources only from well-managed ecosystems. The fourth condition, equally important as the preceding three and echoing the intergenerational definition of sustainable development, is that resources are utilised in such a way as to meet the needs of all people across the world now and in the future. According to Robèrt (Ibid., p. 66), sustainability is achieved when all the four system conditions are met. In other words, the traditional intergenerational definition is lacking crucial aspects concerning the Earth system. Referring to the previously presented theories, the first three conditions could translate into eco-effective measures, whereas the fourth condition underlines the fair and equal opportunity of all human beings to prosper on this planet.

Like Robèrt, Rockström (2015) calls for an integrated approach in which human development is reconnected to the biosphere: the Earth provides the limits within which economy can be used to achieve social goals. Sustainable development cannot be considered separately from social, ecological, and economic viewpoints, but must be considered as a unity. (Ibid.) The more traditional three-pillar approach is inherently flawed, because economy would not exist without human society and the society would not exist without the natural environment. Figure 6 illustrates how economy is a part of the social structures of humanity, which are undeniably dependent on the natural environment.

Rockström (2015) has also addressed the unequal responsibility of the world's nations in the environmental crisis of today. He claims that the high-income countries have enjoyed "a planetary free ride" and are therefore responsible for the unsustainable development of the past decades. At the same time as limits to human development are being proposed by scientists of these richer nations, billions of people living in poverty are striving for a better life. Rockström (Ibid.) emphasises, however, that "economic growth in the Global South and global sustainability are compatible aims". This merely requires that the finite resources must be distributed fairly among all nations of the world.

SUSTAINABILITY

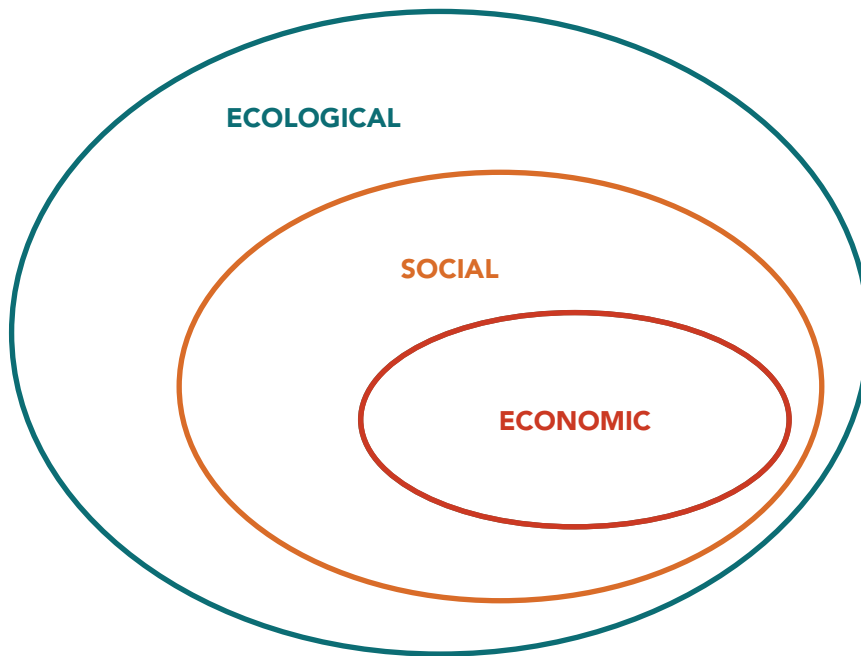


Figure 6. *Sustainability. The new premise for defining sustainable development — or sustainability — nests the three traditional components. In this model, ecological sustainability is the precondition for social and economic sustainability. Presented by e.g. Rockström (2015).*

2.4 The new definition of sustainable cities

Although cities are one of the major sources of waste and emissions, they are also considered possibly the best scale to tackle global ecological problems (Trogal, et al., 2019). Sustainable development is also seen increasingly dependent on the successful management of urbanisation and the sustainability of cities (Ahern, 2011). United Nations (2018d) consider all three dimensions of sustainability — ecological, social, and economic — to be closely related to urbanisation. They assert that minimising adverse impacts on the environment are possible, if urbanisation is managed in a proper way.

United Nations' Sustainable Development Goal 11 — making “cities and human settlements inclusive, safe, resilient and sustainable” — is monitored through indicators like proportion of urban dwellers living in informal settlements, proportion of population with convenient access to public transport, number of people affected by disasters, proportion of urban solid waste collected, and average share of open public space relative to built-up area (United Nations, 2018a). The same criticism presented before on the SDGs in general also applies to Goal 11; although the overarching goal is essential, none of the indicators gives concrete, measurable targets to be achieved. All the targets are about providing access, significantly reducing one thing, or substantially increasing another, with no implication of how much access is enough, or what is a

significant reduction or substantial increase in percentage. Thus, the goal and definition of a resilient and sustainable city remain vague.

Despite the vagueness of the goal, urban design and planning are in the heart of managing urbanisation in a sustainable way and making cities resilient and sustainable. In Oxford English Dictionary (Oxford University Press, 2019), sustainable architecture and sustainable city are characterised by minimising environmental degradation, using low-impact materials and energy sources, and designing infrastructure in such a way as to limit their impact on the natural environment. Wording here follows the popular definition of sustainability today: instead of avoiding, sustainability is about minimising; instead of zero-impact, sustainability is about low-impact; and instead of preventing, sustainability is about limiting. This vocabulary has been criticised, amongst others, by Braungart and McDonough (2008, p. 45), who argue that “being less bad is no good”.

If sustainability is considered as presented above as human development that respects the limits of planet Earth, there is an inherent fault in the definition of the tool — sustainable architecture — and the outcome — sustainable cities. The definition of both allows the exploitation of natural resources and pollution of the environment, as long as there are efforts at minimising and limiting. If cities are developed following this definition and if cities are considered as part of the core solution of sustainable development, there will be serious difficulties in achieving sustainability.

Sustainable cities and sustainable urban design and planning must be redefined based on the theories presented previously. For urban design and planning to be compatible with the goal of sustainability, they must follow the principles of eco-effectiveness, in other words, respect nature’s laws and integrity and imitate its cycles of matter. Sustainable cities, on their part, must avoid environmental degradation, use zero-impact materials and energy sources, and design infrastructure in such a way as to prevent their impact on the natural environment.

Even though ecological sustainability is prioritised here, it is not plausible to neglect the social dimension, when addressing the sustainability of cities. As the SDG 11 states, from the social perspective, sustainable cities are safe and inclusive. Good urban planning can guide cities towards this ideal, but architecture can also be harnessed as a tool for segregation. Architect David Adjaye (2015) writes that zoning in urban planning is no longer the only way of segmenting the city. Today, segregation may also be achieved vertically: high-rise developments enable the elite class to escape the unliveable conditions on the ground. Adjaye points at the big cities of the developing world where “glittering towers stand in stark contrast to ground-level chaotic slums that lack the most basic infrastructure” and calls for new innovations in vertical typologies to respond to the unprecedented densities in cities. Adjaye states that these typologies must empower people, enrich their surroundings, and build a more egalitarian future. (Ibid.) In summary, when employed appropriately, urban design and planning have the opportunity to respond to all the requirements of the SDG 11, making cities inclusive, safe, resilient, and sustainable.



Image 6. Biking will be an important means of transport in sustainable cities. Man biking on Malawi Road in Chuini, Zanzibar Town.

2.5 Conclusion

As a conclusion of the views presented in this chapter, this thesis proposes that sustainable development should be redefined as human development that is equally available for all and that avoids all kind of environmental degradation. This thesis argues that it is irrelevant to address social or economic sustainability, unless ecological sustainability is ensured. Without the stability and sustainability of the environment, there will be no conditions for social or economic development. However, the social dimension must be acknowledged to ensure the realisation of global equality in the future.



chapter 3

THE MEANS: IMPROVING RESILIENCE WITH URBAN DESIGN

“The future will be predominantly urban, and the most immediate environmental concerns of most people will be urban ones.”

— United Nations (1987, p. 255)

A resilient plant has found a place to grow in Stone Town in Zanzibar.

The future world is largely urban, which means that cities play a key role in tackling sustainability issues today and tomorrow. Housing the growing population and planning cities that support the harmonious co-existence of social and ecological systems must happen in a sustainable way. Urban design is crucial in solving this equation.

This chapter first introduces resilience thinking and the core concept of this thesis — resilience. Next, the chapter presents one example of applying resilience thinking: a proposal of defining a safe space for human development on planet Earth. Then, the chapter sheds light on the relationship between sustainability and resilience. And finally, urban design and planning are studied as tools to improve resilience in cities.

3.1 Resilience thinking as systems thinking

Resilience thinking is systems thinking: it emphasises the importance of considering the system as a whole instead of breaking it into smaller parts which are considered independently. Walker and Salt (2006) stress that isolating components of a system and solving their challenges separately may result in more widespread problems, because efficiency endeavours in one part of the system make the other parts respond in unpredictable, often undesirable ways. Optimisation is not the solution, either; dynamic systems, like planet Earth and all systems within it, do not have an optimal state (Ibid., p. 141).

The underlying assumption of resilience thinking is that humans and nature are so intertwined that they should be considered as one social-ecological system (Stockholm Resilience Centre, 2015; Walker & Salt, 2006). Brian Walker and David Salt (2006, pp. 11, 31–32) emphasise that the entire world consists of these social-ecological systems, and the key to achieving sustainability in these systems is resilience. Resilience is the capacity of a system, community, or society to resist and absorb disturbances and to adapt to change by transforming and continuing to develop while maintaining its core characteristics (Stockholm Resilience Centre, 2015; Walker & Salt, 2006; UN-ISDR, 2017).

Social-ecological systems are complex adaptive systems (Walker & Salt, 2006). This means that the systems change in an unpredictable, non-linear way, they may exist in various regimes¹ in which their structure, feedbacks², and function vary, and they may be driven across a threshold³ into a new regime by disturbances (Ibid., p. 31). A resilient system is able to undergo change without crossing a threshold to a new regime that would imply a new identity (Ibid., p. 32).

¹ *Regime.* The state which the system is currently in; systems can exist in various stable states (Walker & Salt, 2006, p. 11).

² *Feedback.* A connection between components of a system that either reinforce or dampen change; positive feedback and negative feedback respectively (Stockholm Resilience Centre, 2015).

³ *Threshold.* The tipping point between regimes; crossing a threshold makes the system behave in a different way with different feedbacks, and different structure (Walker & Salt, 2006, p. 11).

Resilience in and of itself is not good or bad. When resilience maintains a system in a desirable state or regime, it is usually considered a good quality. Sometimes the resilience of a system maintains an undesirable regime, however. If a system's resilience for instance sustains a vicious cycle of poverty, weakening the feedbacks that maintain the undesired state might be necessary (Simonsen, et al., 2015). In the contemporary debate on the concept of resilience, not everybody supports the interpretation of resilience as a quality that should maintain a system in its current regime. There is a distinction between 'equilibrium' and 'evolutionary' interpretations of resilience (Scott, 2013). According to Mark Scott (Ibid.), the equilibrium approach assumes that returning back to normal is the desirable outcome in a resilient system, whereas evolutionary resilience emphasises the system's ability to transform and move forward. The interpretation of evolutionary resilience embraces the opportunity to use disturbances as a catalyst for positive change. A resilient social-ecological system has the ability of turning disturbances into opportunities of innovation and development (Folke, 2006). For instance, a resilient community experiencing severe flooding might turn this disturbance into positive change by developing innovative systems to manage storm water or channel it to fields for irrigation.

To improve resilience in social-ecological systems, a group of researchers have defined seven principles of resilience thinking to follow (Figure 7, see next spread). The principles were first presented in the article *Towards principles for enhancing the resilience of ecosystem services* by researcher Reinette Biggs and colleagues (2012), and later expanded on in the book *Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems*, of which the Stockholm Resilience Centre has made a popular summary (Simonsen, et al., 2015). Following the principles requires profound understanding of the interactions and dependencies between the principles. Most importantly one must answer the question: Whose resilience is built and to what? Simply enhancing resilience might lead to unexpected and unwanted results. (Ibid.)

3.2 Planetary Boundaries as an example of resilience thinking

Resilience thinking is the basis upon which a new framework for sustainability was largely built in 2009: the planetary boundaries approach. Planetary Boundaries are a fine example of emphasising the system as a whole instead of paying attention to singularities. The approach follows the definition of sustainability as presented in Chapter 2 (see Figure 6): human activities must be considered dependent on the Earth's limited capacity.

Planetary Boundaries (PBs) is a novel approach to global sustainability, which suggests nine interdependent boundaries that must not be transgressed in order to avoid abrupt, non-linear, or irreversible environmental change at regional to global scales (Rockström, et al., 2009; Steffen, et al., 2015a). The boundaries were first introduced in 2009 and updated in 2015. The aim of defining the boundaries is to determine a safe space for human development on planet Earth. The planetary boundaries approach

PRINCIPLES FOR RESILIENCE THINKING IN SOCIAL-ECOLOGICAL SYSTEMS

1 MAINTAIN DIVERSITY AND REDUNDANCY

Maintaining diversity is crucial, because the more components a system encompasses, the more resilient it is. Redundancy provides compensation in case of loss or failure of another component.

2 MANAGE CONNECTIVITY

Connectivity entails both benefits and risks: a highly connected system recovers more quickly from a disturbance, but overly connected system facilitates spread of disturbances within the system.

3 MANAGE SLOW VARIABLES AND FEEDBACKS

Feedbacks are a system's reactions to disturbances. Feedbacks that keep the system in a desirable regime should be strengthened. Slow variables should be monitored, because letting a system reconfigure into a new regime might not be beneficial for the production of essential ecosystem services and the regime shift might be irreversible.

4 FOSTER COMPLEX ADAPTIVE SYSTEMS (CAS) THINKING

CAS thinking alone does not enhance a system's resilience, but it results in management actions that can improve resilience. It appreciates the complex interactions between ecosystems and actors within a social-ecological system.

5 ENCOURAGE LEARNING

Social-ecological systems face constant change and their management requires dealing with uncertainty and surprise with incomplete knowledge. Management should be based on continuous learning across the system, and traditional and local knowledge must not be ignored.

6 BROADEN PARTICIPATION

Broadening participation builds resilience by improving legitimacy, increasing knowledge, and helping detect disruptions. Early participation helps in defining priorities and needs, and diversity of stakeholders ensures equal opportunity to influence within the system.

7 PROMOTE POLYCENTRIC GOVERNANCE SYSTEMS

Polycentric governance enhances resilience of ecosystem services in six ways: "it provides opportunities for learning and experimentation; it enables broader levels of participation; it improves connectivity; it creates modularity; it improves potential for response diversity, and builds redundancy that can minimize and correct errors in governance". It also enables right people to address a problem at the right time.

Figure 7. Principles for applying resilience thinking in social-ecological systems. It is crucial to understand the interactions and dependencies between the principles. Based on Biggs, et al. (2012) and Simonsen, et al. (2015).

considers the variations within the Holocene state of the Earth System as the desirable planetary state. (Rockström, et al., 2009.)

According to the 2015 update (Steffen, et al., 2015a), the identified planetary boundaries are: change in biosphere integrity; biogeochemical cycles of nitrogen and phosphorus; climate change; ocean acidification; land system change; freshwater use; stratospheric ozone depletion; atmospheric aerosol loading; and introduction of novel entities. More boundaries might be identified in the future.

The PB approach offers an overview of the extent of the unsustainability that human activities have reached on planet Earth. Figure 8 illustrates the latest estimation of the state of the nine boundaries. The researchers behind the approach claim that four of the defined boundaries have been transgressed so far: the integrity of the biosphere has by far crossed the proposed boundary, the boundaries of the biogeochemical flows and land system change have been transgressed, and the atmospheric concentration of CO₂, control variable for climate change, is way beyond the boundary and continues to rise (Steffen, et al., 2015a).

Steffen and colleagues (2015a) argue that climate change and biosphere integrity are highly integrated and provide the systems within which the other processes operate; the

PLANETARY BOUNDARIES

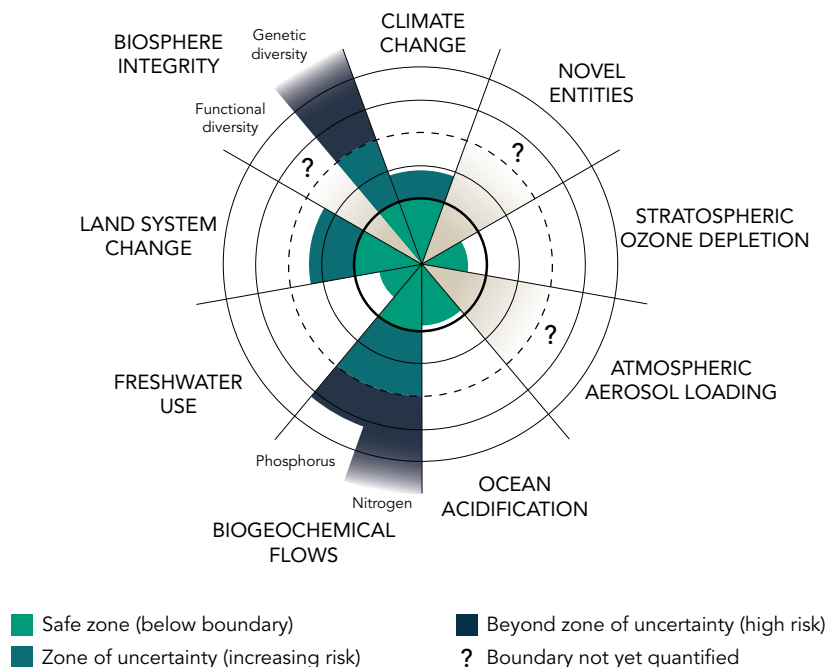


Figure 8. Planetary boundaries. Biosphere integrity, biogeochemical flows, land system change, and climate change have crossed the thresholds to a zone of uncertainty. Adapted from Steffen, et al. (2015a).

other boundaries regulate them. Therefore, the researchers have suggested a two-level hierarchy where climate change and biosphere integrity are seen as core boundaries and the others operate through them. They note that crossing the other boundaries may affect human well-being but will not lead to a new state of the Earth System whereas crossing the core boundaries will do that. (Ibid.)

Planetary boundaries should also guide urban design and planning, which must consider land use change from the point of view of biodiversity, climate change mitigation, and environmental protection. Urban design and planning can protect the planetary system most effectively by considering the planetary boundary of land system change.

In the original article presenting the planetary boundaries, Rockström and colleagues (2009) propose that the control variable for land system change is the amount of cropland which should occupy no more than 15% of the global ice-free land surface. Most productive areas should be reserved exclusively to food production and processes that threaten this allocation, such as urbanisation, should be controlled. If land degradation, biofuel production or urban development lead to the loss of too much productive land globally, food security is under risk due to lower yields and accelerated degradation. To avoid this, the most productive land should be reserved for agricultural use, high-conservation value ecosystems should be maintained in their current condition, and carbon-rich ecosystems should be sustained in their carefully managed or undisturbed state. (Ibid.)

In the update to the planetary boundaries, Steffen and colleagues (2015a) propose a different control variable for land system change. Instead of the amount of cropland, the planetary boundary should be considered from the point of view of the amount of remaining forest cover. This is due to the fact that forests directly regulate climate. Urban planning should thus pay special attention to the preservation of forests and other green areas that have carbon sequestering abilities. (Ibid.)

Despite providing an innovative perspective on sustainability issues, the PB approach has also encountered criticism e.g. for not being adapted to policy (Stockholm Resilience Centre, 2015) and for not considering social or equity aspects (Revkin, 2015). These criticisms miss the target, however, as the PB framework was designed to advance Earth System science (Stockholm Resilience Centre, 2015). The framework emphasises the limitedness of the Earth's ecological capacity and demonstrates that climate change, which is currently dominating the press, is merely one among many severe issues, and not even the one most gravely out of control. Furthermore, the planetary boundary framework underlines the importance of resilience thinking in the Anthropocene. As pointed out in Chapter 2, Rockström (2015) has also addressed the social aspect of the PB framework and stressed the importance of distributing the available operating space in a just manner between the world's nations. Considering the earlier free ride of the richer nations, this might be interpreted so that the richer nations are responsible for more cutbacks, whereas the developing countries might be allowed more space to ensure their inhabitants' well-being.



Image 7. *Old resilient mango tree in Chuini, Zanzibar Town.*

3.3 Resilience as key to sustainability

The relationship between sustainability and resilience has various interpretations on the research field. According to Dayton Marchese and colleagues (2017), sustainability and resilience are considered as entirely unrelated by some, and as the same concept by others. They point out that neither sustainability nor resilience is a distinct entity, but both are used to describe other entities, often systems, the scales of which range from a person's mental or physical health to the scale of the global economy. They also note that both sustainability and resilience focus on the system's ability to survive both in normal conditions and under disturbances. (Ibid.)

Despite these similarities, sustainability and resilience are distinct concepts. According to Marchese and colleagues (2017), sustainability is often regarded to focus on larger spatial scales and longer temporal scales than resilience. Resilience may also

be achieved on one scale at the expense of another. In community development, preserving traditional methods is essential to sustainability initiatives, whereas resilience initiatives emphasise adaptation to new conditions through innovation. The outcome of a system is central to sustainability, whereas resilience focuses on processes. (Ibid.) Marchese and colleagues (Ibid., p. 1276) argue that understanding the differences and similarities between sustainability and resilience is crucial, because otherwise “decision makers may fail to capitalize on synergies or account for competing objectives, leading to underperformance and future conflict”.

Based on a literature study, Marchese and colleagues (2017, p. 1276) suggest there are three dominating frameworks for organising sustainability and resilience: “(1) resilience as a component of sustainability, (2) sustainability as a component of resilience, and (3) resilience and sustainability as separate objectives”. *The first framework* takes sustainability as the main objective and describes resilience as a vital part of it. In this framework sustainability may be increased by increasing resilience, but resilience is not necessarily increased by making a system more sustainable. Resilience is also considered an inseparable component of sustainability: without resilience there cannot be sustainability. (Ibid., p. 1276.) *The second framework* considers resilience as the primary objective and proposes that sustainability contributes to resilience. This framework is used for example in the fields of public policy, supply chain management, and business management. Contrary to the first framework, the second asserts that resilience may be improved by increasing sustainability, but sustainability cannot be increased by making the system more resilient. (Ibid., p. 1276–1277.) *The third framework* considers sustainability and resilience as complementing or competing concepts that have separate objectives. This framework is supported for example in the fields of civil infrastructure, economics, public policy, community resilience, and urban planning. The third framework does not see resilience contributing to sustainability or the other way around. It asserts that best results are achieved when sustainability and resilience efforts are joint and simultaneous. (Ibid., p. 1278.)

Although seeing sustainability and resilience as separate objectives is more common in the field of urban planning (Marchese, et al., 2017), in this thesis, resilience is considered a key component of sustainability and a tool to improve it, as proposed by Walker and Salt (2006). This is because resilience framework helps cities adapt to constant change and to build preparedness for the unforeseen future, and this cannot be detached from sustainability endeavours. According to Walker and Salt, resilience thinking “embraces the dynamic nature of the world” and leads to understanding the thresholds that should not be crossed to maintain the systems humanity depends upon (Ibid., p. 140). This links back to the sustainability framework presented in Chapter 2; aiming to protect planet Earth’s capacity to support life. To achieve the overarching goal of sustainability, cities must be planned and built to be resilient.

3.4 Urban design and planning as tools to improve resilience

Urban design and planning play a significant role in building the sustainable world of tomorrow, but thus far they have not been very adaptive to the constant changes typical of the recent decades. Landscape architect and professor Jack Ahern (2011) writes that in urban planning, sustainability used to be considered a stable urban condition that could be maintained for a long time once achieved. This view ignored the existence of unpredictable disturbances, which makes the asserted sustainability paradoxical, and thus, Ahern proposes resilience theory as another way of considering urban planning (Ibid.). This approach could be seen to represent the interpretation of evolutionary resilience, in which the system is prepared for unexpected disturbances and responds to them by transforming.

The notion of the key role of resilience is also supported by architect and researcher Kim Trogal and colleagues (2019, p. 1), who argue that “resilience will be a defining quality of the twenty-first century”. Considering resilience in urban planning has, indeed, gained in popularity in recent years (Simon, Griffith, & Nagendra, 2018), although protecting and restoring urban ecosystems have become part of resilience planning only recently (McPhearson, et al., 2014). Professor David Simon and colleagues (2018, p. 153) list that in the urban planning context, resilience has been defined as a process, a goal, and a desired outcome, making it hard to measure progress. According to them, in the face of more frequent extreme weather events in the last decade, resilience has become almost synonymous to adaptation: being resilient is considered the same as having adaptive capacity to, for example, extreme climatic events (Ibid., p. 156).

Ahern (2011) has proposed five strategies to strengthen urban resilience by planning (Figure 9). These partly overlap with the principles for applying resilience thinking in social-ecological systems — which cities also are — presented earlier (see Figure 7).



Figure 9. *Strategies for strengthening urban resilience by planning proposed by Ahern (2011).*

The first strategy proposed by Ahern (2011), multifunctionality, responds to the need of maintaining ecosystem service provision in densifying and growing urban areas. Combining functions is a natural way of achieving this: examples include floodplain parks and wildlife highway crossings. *The second strategy*, redundancy and modularisation, considers distributing risks across geographical areas and multiple systems, and across time. Retrofitting — reinforcing or upgrading existing structure to improve resilience (UNISDR, 2017) — is an example of one such strategy. (Ahern, 2011) Walker and Salt (2006, p. 7) also stress the importance of redundancy by pointing out that eliminating redundancies to achieve better efficiency within a system dramatically reduces the resilience of the system.

The third strategy suggested by Ahern (2011), diversity, ensures a variety of responses to disturbances. Maintaining biological, social, physical, and economic diversity are crucial for urban resilience. Planning solutions are exemplified by bioswales, permeable pavements and urban tree canopies, of which each adds to the response diversity in stormwater management. Social and economic diversity, on the other hand, ensure better ability to respond and adapt to socio-economic changes. *The fourth strategy*, connectivity, is called the “primary generator of sustainable urban form” by Ahern (Ibid.). Connectivity is needed in multi-scale networks to enable smooth flow within the system. In urban planning, walking ways should connect to bus routes, and drainage should connect to swales which further connect to streams, and so on. *The fifth and final strategy* proposed by Ahern is adaptive planning. It takes uncertainty as the starting point to create a hypothesis of how a project might influence an area. The implemented project becomes an experiment of which new knowledge may be obtained through monitoring and knowledge. (Ibid.)

Resilience thinking calls for a comprehensive approach in urban design and planning (Figure 10). To underline the importance of considering the entire system instead of considering its parts separately, Walker & Salt (2006, p. 32–33) offer an example. A wetland and a nearby suburb are parts of the same system. Scientists who want to protect the wetland for the ecosystem services it provides, developers who want to drain the wetland for a new housing area, and the government agency that manages the wetland, are all part of that system, too. Changes in one part of the system result in feedbacks in other parts of it: changing the legislation that protects the wetland, draining the wetland, or changing the attitudes of the scientists or the developers will resonate in other parts of this complex social-ecological system. (Ibid.) Architects and urban planners must be able to appreciate the complexity of this system and provide systemic solutions to enhance the resilience and sustainability of the entire system, be it a neighbourhood or a city. The need to apply resilience thinking, and thus transition to systems thinking, implies the need for a new role for urban designers. They must be able to tackle larger entities than before and deepen the collaboration with other professionals and stakeholders.



RESILIENT URBAN DESIGN

- ... applies resilience thinking in the design process*
- ... considers social justice and engages involved communities in the design process*
- ... considers land use from the point of view of biodiversity, climate change mitigation, and environmental protection*
- ... designs infrastructure in such a way as to prevent their impact on the natural environment*
- ... promotes utilising zero-impact materials and energy sources*
- ... results in sustainability in cities*

Figure 10. Resilient urban design. Requirements to guide the design of more resilient and sustainable cities. The image portrays a newly planted sapling in Ng'ambo, Zanzibar Town; planting trees is a simple way of supporting resilience in cities.



Image 8. Shade is vital under the pouring sun of the equator. Trees will be increasingly important in cities to provide shade and help in storm water management. House in an informal settlement in Ng'ambo, Zanzibar Town.

The dimension in which architecture must intervene to foster resilience, according to Trogal and colleagues (2019, p. 2), is the human scale, or the scale of everyday life, buildings, and neighbourhoods. Considering resilience only from the point of view of ecology or climate is not sufficient but must be complemented with social justice and community imperatives (Ibid.). Researcher Deena Khalil and colleagues (2013) also call for environmental justice to be incorporated into urban resilience. UN Habitat (2015) defines environmental justice as an approach that aims at restraining abuses of power in relation to natural resources and calling for empowerment of the urban poor who are disproportionately vulnerable to environmental impacts.

Khalil and colleagues (2013) point out the same inequality as Adjaye earlier in Chapter 2 when they stress that there are “multiple environmental (in)justices within the

same city” due to the existence of multiple cityscapes within one urban area. They emphasise that this affects the resilience of the whole city and further note that “resilience itself is distributed in unjust ways”, although resilient cities are often considered more just cities. Khalil and colleagues also question, for instance, whether certain members of society should make sacrifices for the resilience of the larger community. They ask which will win in such cases — justice or resilience. (Ibid.) Trogal and colleagues (2019) underline that resilience must address the redistribution of the means of resilience — resources and capacities — and consider justice in its processes, enabling participation and empowerment.

3.5 Conclusion

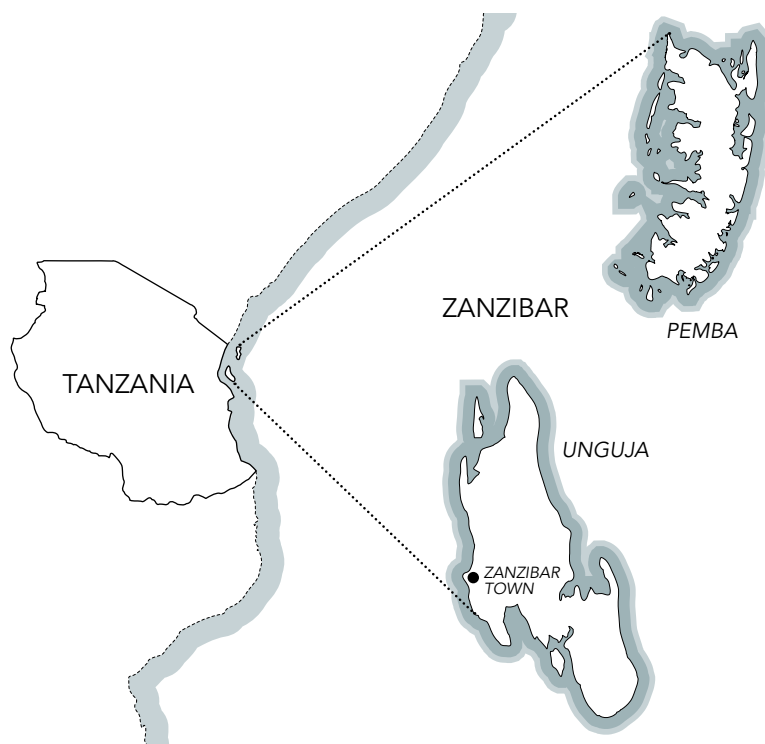
The more resilient cities are, the better they can adapt to constant changes and disturbances inflicted by the constantly changing world around them. Particularly evolutionary resilience supports positive changes in systems. As presented in this chapter, in this thesis, urban design and planning are considered key tools in building resilience in cities and thus fostering sustainability. In addition to building urban resilience, urban design and planning have immense potential in coordinating the redistribution of resources and capacities in resilience building, and in enhancing resilience in cities in a just way. This requires, however, the adoption of a new role by the designers, in which they are able to tackle larger entities and collaborate with multiple stakeholders.

PART II

case study

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ZANZIBAR



Zanzibar is a semi-autonomous region of the United Republic of Tanzania in East Africa

AREA 2,654 km²

CAPITAL Zanzibar Town on Unguja

HISTORIC CENTRE Stone Town in Zanzibar Town
(UNESCO World Heritage Site)

POPULATION 1.5 million (2017 estimate);
600,000 in and around Zanzibar Town

DENSITY 603 persons / km² (2017 estimate)

HDI 0.64, medium (2017)

OFFICIAL LANGUAGES Kiswahili, Arabic, English

RELIGION Islam (98.9 %), Christianity

CLIMATE Tropical

MAIN INDUSTRIES Spices (cloves, nutmeg, cinnamon, black pepper),
raffia palms, tourism

GLOSSARY

DoURP Department of Urban and Rural Planning in Zanzibar

ZANPLAN The Zanzibar master plan guiding urban development in Zanzibar

SHEHIA The smallest administrative unit in Zanzibar

SHEHA The head of a shehia; works under the government and is always a member of the ruling party

BARAZA A bench integrated in the front facade of a Swahili house; semi-public space, where anyone can sit down. Refers also to seating areas in public places.

SWAHILI HOUSE A typical one-family house in Zanzibar, in which the extended family often lives together. Most often built out of cement blocks with a ridged roof of corrugated metal sheets. Typical layout consists of a corridor with attached rooms; more public spaces are close to the front door and private spaces like bedrooms, bathroom, and kitchen are in the back. Kitchen is often outside or connected to an outdoor area.

DALA DALA Local public transport in Zanzibar

MADRASA Islamic school



chapter 4

THE CHALLENGE: URBAN DEVELOPMENT IN ZANZIBAR

*“The desire by everyone to own a house
has exerted pressure on the demand for
land for housing in urban areas.”*

— UN Habitat (2010, p. 3)

*Foundation of a house-to-be in an informal settlement in Chuini, Zanzibar Town.
Many families build their homes layer by layer in the course of multiple years.*

Zanzibar Town is experiencing rapid population growth and urbanisation typical of African cities. As an island, Zanzibar's resources are inherently limited and it is preparing for the effects of climate change, particularly sea level rise and extreme weather events. Like in many other developing countries, urbanisation in Zanzibar has resulted in urban sprawl and the emergence of informal settlements. These developments must be urgently taken under control to ensure the sustainable development of the city and the resilience to environmental changes must be enhanced to tackle existing and forthcoming challenges. This chapter presents the current conditions and future projections of population growth, urbanisation, informal settlements, and environmental challenges in Zanzibar.

4.1 Population growth and urbanisation in Zanzibar

The United Republic of Tanzania in East Africa is currently the 25th most populous country in the world with 58 million inhabitants and its population is growing at a three per cent annual rate (World Population Review, 2019b). According to United Nations data (UN Population Division, 2017), Tanzania is among the nine countries, which are projected to be responsible for half of the world's population growth between 2017 and 2050. Furthermore, the population of Tanzania is projected to be at least five times as large in 2100 as it was in 2017 (Ibid.).

Tanzania consists of the Mainland (formerly known as Tanganyika) and the islands of Zanzibar (main islands Unguja and Pemba), which were brought together in 1964 after Tanganyika had become independent of British colonial rule in 1961 and Zanzibar in 1963. Zanzibar is a semi-autonomous region of Tanzania and its islands are located 25–50 kilometres off the coast of the Mainland.

According to the 2012 census (Office of the Chief Government Statistician Zanzibar, 2018, p. 14), there were 1.3 million people living in Zanzibar. Statistical projections estimate the population in 2017 to have been over 1.5 million, which implies an increase in population density from 530 people / sq. km in 2012 to 603 people / sq. km in 2017 (669 people / sq. km in Unguja alone) (Ibid., p. 14, 19). Department of Urban and Rural Planning in Zanzibar (DoURP, 2014, p. 10) prepare for the population of Zanzibar to grow to 2.2 million by 2035, when Zanzibar Town is projected to host 1.25 million inhabitants. They estimate that the growth in population would require 181,500 new homes to be constructed, which would require 8.200 ha additional land, if those homes were constructed as one-storied detached houses (Ibid.).

DoURP (2014, p. 10) reports that the built area of Zanzibar Town doubled between 2004 to 2012, from about 2,700 ha to 5,950 ha, whilst the population increased by 60 %. Due to the rapid increase in single story residential development, urban density reduced from 111 persons per ha to 81 persons per ha. There is a significant deficit of housing stock to accommodate the growth in population. Lack of affordable and accessible housing has resulted in increasing numbers of unplanned, informal settlements around all town areas, especially Zanzibar Town. These areas lack basic services in most cases. (Ibid.)

4.2 Informal settlements in Zanzibar

According to the Millennium Development Goal -report, 51 % of the population in Tanzania were living in slums in 2014 (UN Statistics Division, 2015). Despite the great proportion, it is still a major improvement from 77 % in 1990 and 70 % in 2000 (Ibid.). Although referred to as slums in the MDG reporting, the word slum is rarely coupled with the under-serviced settlements in Tanzania; they are more often described as informal settlements.

According to UN Habitat (2010, p. 6), informal settlements in Tanzania are characterised by overcrowding and inadequate access to safe water and sanitation, but the situation concerning tenure security and structural quality of housing is different to that of many other informal settlements. This is due to government policies that have offered some perceived security of tenure to people who build their homes in informal settlements (Ibid.). First, since the early 1970s, the government has invested in improvements in informal settlements with financial and technical support from the World Bank. Secondly, the National Land Policy from 1995 guarantees a fair compensation to anyone whose recognised long-standing occupation is interfered with. Thirdly, the government adopted a policy in 2000 that aims at slum upgrading with the government as the facilitator. The perceived security of tenure has probably encouraged people to utilise permanent and modern building materials, like concrete, cement, tiles, burnt bricks, and metal sheets, in the construction of their homes, which has created settlements of durable and permanent nature. (Ibid. pp. 6–7.)

Another distinctive characteristic of informal settlements in Tanzania, according to UN Habitat (2010, p. 7), is that people from all economic groups live side by side. It is relatively easy to get access to land for housing in the informal market compared to the formal system, which makes it an attractive option. UN Habitat evaluates that the favourable land policy and security of tenure probably also contribute to utilisation of permanent building materials. (Ibid.)

UN Habitat (2010, p. 3) describes that in Tanzania, land in informal settlements is accessed through informal mechanisms, most commonly by purchasing land from local landowners. Approaches to land access also include allocation by local leaders, inheritance, and occupation without permit. At the national level, home ownership is declining, while tenancy is on the rise but there are regional variations. For instance, in Dar es Salaam the trend is the opposite. (Ibid.)

“The population of Zanzibar is rapidly increasing. Assessments indicate that about 60 to 70 percent of the urban residents live in unplanned or unauthorized settlements, which are characterised by inadequate basic services.”

— Zanzibar Environmental Policy (DoE Zanzibar, 2013)

According to UN Habitat (2010, p. 3), all land in Tanzania is public land due to historical development. All land in Tanzania was declared as crown land by the German colonisers in 1889. This declaration was enacted into a law by the British in 1923 and has guided land administration since then. The concept of private land ownership does not exist, but right to occupy and use land on leaseholds is possible for individuals and groups in terms of 2, 33, 66, or 99 years. (Ibid.)

What is said above about Tanzania in general, applies to Zanzibar as well. The characteristics of an informal settlement apply to most of the settlements outside of Stone Town in Zanzibar Town. In all these areas, buildings come first, and services come later, if they do at all. The emergence of the settlements is better characterised as urban sprawl than controlled urban development that would follow official planning guidelines. These settlements have emerged on governmental land to which the people have no right of occupancy, although the National Land Policy gives the same perceived security for the inhabitants as elsewhere in Tanzania. Furthermore, there is some internal organisation and planning of the unoccupied space orchestrated by the inhabitants, which decreases the sense of informality of the settlements. Due to these reasons, the Director of the DoURP Dr. Muhammad Juma, would rather call them semi-informal settlements (see Appendix V). For clarity, however, they will be defined and handled as informal settlements in this thesis based on the UN Habitat definition presented in Chapter 1 (see Figure 2).

4.3 Environmental challenges in Zanzibar

The main planning document guiding urban planning in Zanzibar, ZanPlan, states that urban sprawl on Zanzibar Town's edges has already resulted in degradation of the natural environment, e.g. loss of forests and scarce agricultural lands and pollution of water sources (ZanPlan, 2015, p. 7). Urban sprawl has also encroached on important water retention areas causing and exacerbating flooding. The ZanPlan further reports that between 2004–2013 agricultural land area was reduced by 10 % and during the same time period, unoccupied open space was reduced by 30 % with either development or cultivation. The area of public open spaces such as parks and sports fields were also reduced by over 15 %. (Ibid., p. 86.)

In addition to the growing population and urbanisation, Zanzibar Environmental Policy (DoE Zanzibar, 2013) states that environmental degradation in Zanzibar is caused by impacts of climate change, depletion of freshwater resources and other natural resources, inadequate solid waste and wastewater management, increasing demand for land, rising energy demand, loss of biodiversity, and increasing tourism. One of the most complex challenges and the one connected to all the others is climate change. The Environmental Policy estimates that climate change will have adverse effects in Zanzibar on agricultural productivity and fisheries, food security, water availability, and public health (Ibid.), but it will obviously also affect ecosystem services and coastal and marine habitats.



Image 9. *Informal settlements provide challenging living conditions for humans but inflict unfortunate consequences also to the surrounding nature due to lacking infrastructure. A stream of trash in Chuini, Zanzibar Town.*

Zanzibar belongs to the tropical climate zone, where there are no significant temperature variations during the year. By 2050s, climate models project an increase of 1.5 to 2 degrees Celsius in maximum monthly temperatures (Watkiss & Bonjean, 2012). There are four seasons in Zanzibar: *kaskazi* from January to March with warm north-east monsoon, *masika* from April to May with long rains, *kusi* from June to October with warm and dry south-west monsoon, and *vuli* from November to December with short rains. According to the projections (Ibid.), rainfall is estimated to increase during *masika* and *kaskazi*, and to decrease during *kusi*. The climate models further indicate an intensification in heavy rainfall which results in greater flood risks, whereas dry spells during the dry season will intensify. Sea level rise poses a threat to coastal settlements, but also threatens water availability as aquifers are under risk of salinization. (Ibid.)



Image 10. *Small initiatives can have a great impact. The Vikokotoni Environment Society clean up the streets of their neighbourhood in Ng'ambo, Zanzibar Town, every morning. Trash is also collected from door to door and everything is taken to the Society's open-air space in the middle of the neighbourhood where it is sorted for further processing.*

Water supply in Zanzibar relies on groundwater in aquifers under the islands, but the quantity is unknown (DoE Zanzibar, 2013, p. 10). Like sea level rise, informal settlements threaten the quantity and quality of water sources by preventing the recharging capacity of the aquifers and by spreading water borne diseases when pit latrines and septic tanks are constructed too close to a ground water source (Ibid., p. 11).

Tourism consumes a significant amount of the scarce water resources and is also culpable for the increasing masses of waste produced in Zanzibar annually. Currently, 60% of solid waste generated in Zanzibar Town is not collected properly (DoE Zanzibar, 2013, p. 18). There is no waste sorting available at any stage of the management

cycle, which is a significant problem as 80% of solid waste is of organic origin (Ibid.), which could be composted and taken to the agricultural fields instead of landfills. Still today, there is no centralised sewerage system in Zanzibar except for limited areas in Zanzibar Town centre. Massive quantities of sewage are discharged into the ocean daily without proper treatment (Ibid., p. 19).

Excavation is another threat to natural environments in Zanzibar. Available non-renewable resources in Zanzibar include rocks, stones, sand, gravel, and limestone. The excavation sites are rarely rehabilitated, which has resulted in loss of fertile agricultural land, soil erosion, deforestation, pollution of ground water sources, and sea water intrusion (DoE Zanzibar, 2013, p. 11–12). Deforestation is a severe problem from the points of view of climate change mitigation and that of economic livelihoods. Due to the increasing demand for energy and construction materials driven by the growing population, forests in Zanzibar have experienced a severe decline — 90% of the Zanzibari population still rely on wood as fuel for cooking and domestic energy supply (Ibid., p. 13).

4.4 Conclusion

In summary, Zanzibar is encountering a myriad of complex social and environmental challenges. Being an island, Zanzibar has particular challenges in regard to space and availability of resources, which set limits to growth. Land use planning must consider the threats addressed in this chapter: losing valuable agricultural land which provides social and economic security, increasing flood risks caused by loss of water retention areas, and risking freshwater availability by constructing in the vicinity of water sources. To ensure a sustainable and prosperous future for the current and future inhabitants of Zanzibar, urban design and planning must be guided by environmental protection while considering affordability, accessibility, and other crucial social aspects.



chapter 5

THE GOAL: BUILDING A SUSTAINABLE CITY TOGETHER

“Go out there and see what works and what doesn’t work, and learn from reality. Look out of your windows, spend time in the streets and squares and see how people actually use spaces, learn from that, and use it.”

— Jane Jacobs (in Anderson-Oliver, 2018)

School children drawing their daily routes in a workshop in Chuini, Zanzibar Town.

Urban sprawl has invaded valuable agricultural land and water catchment and retention areas, and together with the impacts of climate change, has led to environmental problems, particularly flooding, in many urban areas in Zanzibar. One such area is Chuini on the northern outskirts of Zanzibar Town. This chapter presents the existing plans for the development of Chuini and gives an overview of the characteristics of the area through observations made during site visits on the field trip to Zanzibar. The chapter also presents the results of the inhabitant and stakeholder engagement carried out during the trip. The chapter concludes by summarising aspects to consider in the development of Chuini.

5.1 Existing urban plans

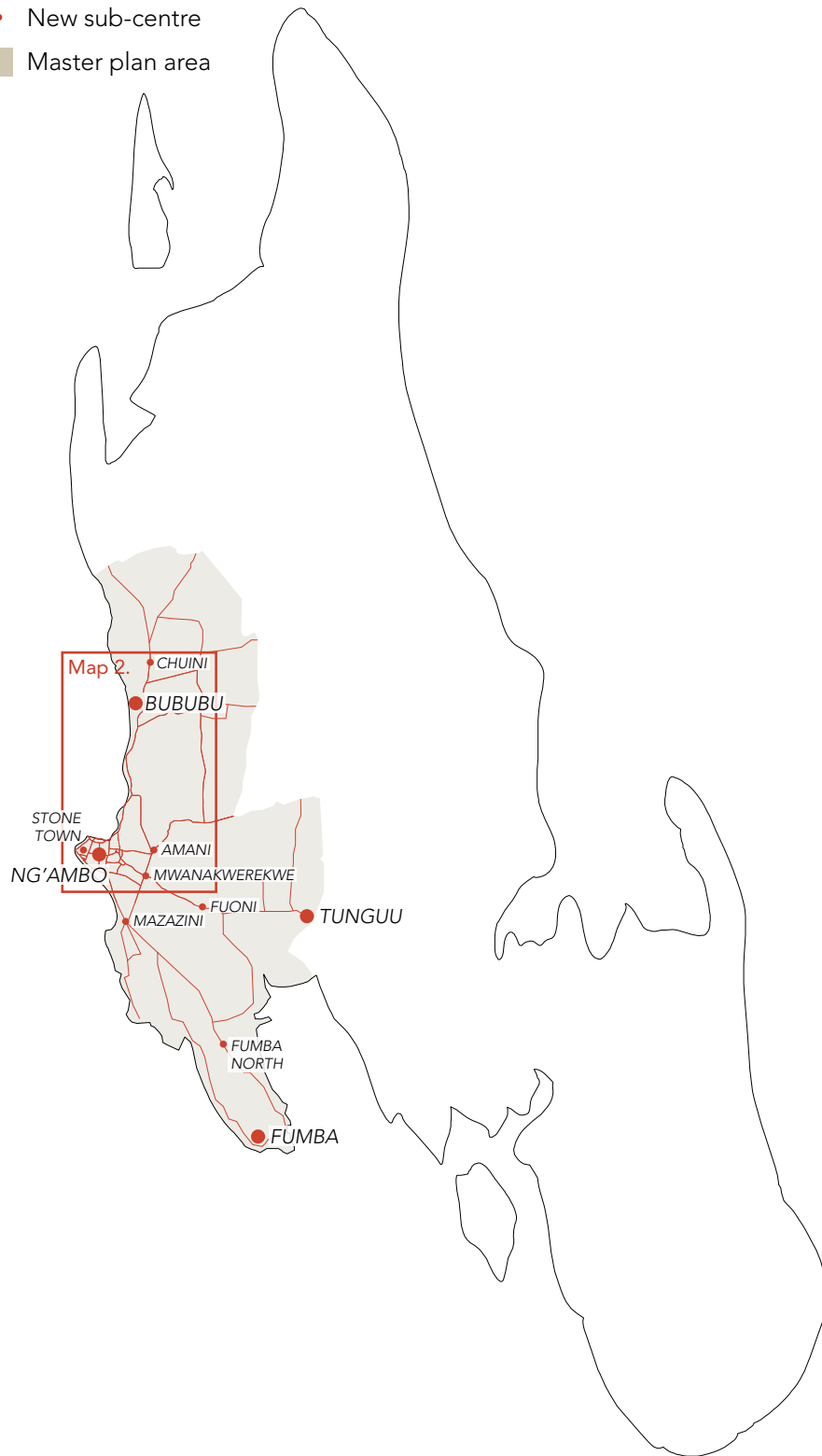
Urban planning in Zanzibar Town is guided by ZanPlan, which is a master plan conducted in 2015 and covers approximately 280 km² in the town centre and its immediate periphery (Map 1). ZanPlan (2015, p. 153–4) proposes Ng'ambo (the 'other side' in Kiswahili, east of the Creek Road that runs along the eastern side of Stone Town), as the new, modern city centre to complement the historical city centre of Stone Town. The plan expresses a need for a series of other centres and sub-centres to ease pressure from the city centre and to serve local demand. The master plan proposes three new urban centres: Bububu Urban Centre near the SUZA (State University of Zanzibar) northern campus and an existing military hospital (to be extended to serve as a major civilian hospital), Tunguu Urban Centre next to the SUZA eastern campus and proposed hospital, and Fumba Urban Centre at the confluence of residential areas and an industrial zone. In addition to these three major urban centres, six sub-centres have been envisioned, of which three in the Inner City and three along the corridors. (Ibid.)

ZanPlan addresses many sustainability issues. For example, it proposes a minimum of three million trees to exist in the master plan area to counterbalance the carbon emissions of the projected 1.5 million inhabitants of the town in the future (ZanPlan, 2015, p. 157). Existing forest coverage of 5 km² is to be extended to 11 km² by 2035, but the coverage of mangroves is expected to remain the same, 6 km² (Ibid., p. 227). The plan defines a constraint for development along the beachfront: development is prohibited 50 metres from the coastline and additionally, development proposals within 200 metres from the coastline are subject to environmental impact assessment (Ibid., p. 33). If there are streams in an area that is planned to be constructed, development is restricted in a 30-metre perimeter from the streams (Ibid., p.342). The master plan also encourages the development of suitable lanes dedicated to pedestrians and bicycles. Walking is still today the most popular mode of transport in Zanzibar and almost half of daily trips are made by walking. Public transport accounts for a quarter of all daily trips according to a survey in 2013. (Ibid., p. 125–126.)

ZanPlan (2015, p. 86) reports that agriculture currently retains half of the landmass in the overall plan area and claims that there is significant potential for densification as only 7 % of the overall plan area is built and in residential areas the coverage is only

Map 1. Zanzibar Master Plan area in Unguja

- New urban centre
- New sub-centre
- Master plan area



20 %. According to the report, Zanzibar Town could house a population of at least one million within its current built area (Ibid., p. 88). Residential uses, including local services, infrastructure and public space, account for 81% of the built areas with public services and limited public space (combined 9%), economic (4.7%) and infrastructural uses (>5%, accounting for the balance) (2015, p. 86).

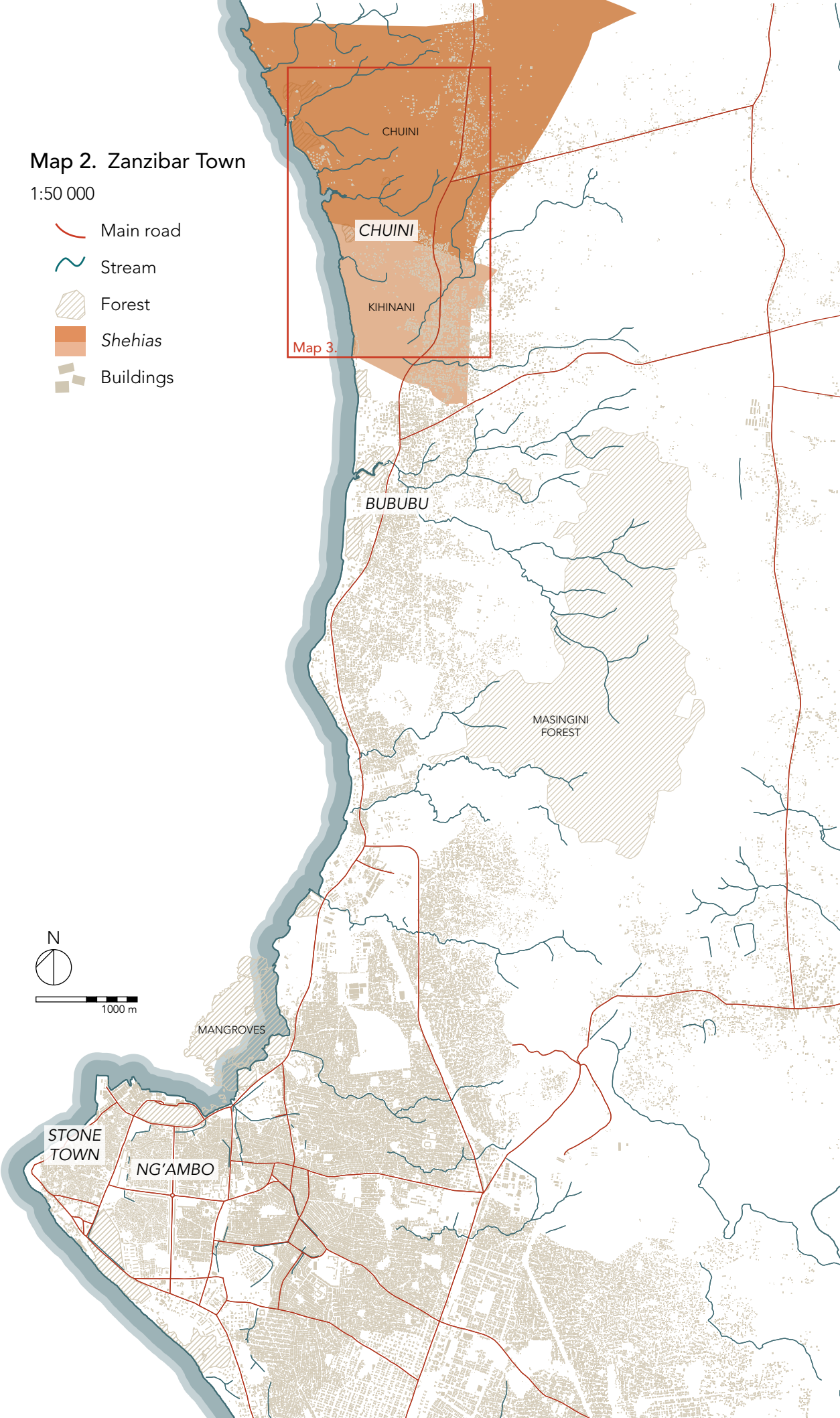
Map 2 zooms into the master plan area showing the current and future city centres of Zanzibar Town and the proposed new urban centre of Bububu and the proposed sub-centre of Chuini. Bububu is located to the north of Zanzibar Town centre. According to ZanPlan (2015, p. 340–1), it is a rapidly urbanising area, but lacks structure, order, and form. The area between Malawi Road — main road running from Zanzibar Town to the north of the island — and the coastline is undeveloped. Currently there is a large zone of agricultural land in the north of the area. There are many separate residential areas, which are characterised as either sporadic or moderate in density and there is a large military area including a military hospital. Along the beach there are informal fishing villages, and some restaurants and bars. There are also sporadic commercial elements along the main road. Proposed activities to the new urban centre area include a civic centre, a bus terminal, park facilities, an industrial zone, wholesale and retail markets, retail shopping, public services, an emergency services centre, sports facilities, and open spaces (Ibid., p. 343).

The focus of this thesis is an area called Chuini which lies just north of Bububu. Chuini comprises two *shehias* (the smallest administrative unit in Zanzibar): Chuini and Kihinani. The name Chuini is used in this thesis to refer to the whole area covering both *shehias*. Chuini is assigned as a sub-centre and it is designated for rapid development, providing housing, services, and livelihoods to the increasing population of the area. According to ZanPlan (2015, p. 211–2), the plan area in Chuini comprises over 900 ha and currently houses 10,000 people with a target population of 91,000 in 2035. The master plan assigns the area to be developed mainly into a residential area: 46 % low density, 34 % moderate density, and 20 % high density housing (Ibid.). See Appendix I for the proposed master plan in Chuini.

According to the National Spatial Development Strategy (DoURP, 2014), Chuini lies in an area that is defined as valuable agricultural area, where the soil type is suitable for cultivation, and east of Malawi Road in Chuini there is also a significant aquifer. Development on this kind of land should take into consideration the economic and environmental effects of the proposed plans (Ibid.). Alarming, ZanPlan proposes the currently existing over 600 ha of agricultural land in Chuini to be given up for development (ZanPlan, 2015, p. 212), without restrictions or notions of the area's vulnerability as wetland (see Appendix I). The loss of agricultural land would also signify the loss of livelihood to many farmers in Chuini. It would further complicate retaining storm water to mitigate flooding and threaten the capability of the area to recharge the aquifer.

Map 2. Zanzibar Town

1:50 000



Map 3. Chuini

1:10 000



5.2 Field observations in Chuini

A more detailed picture of the case study area in Chuini was formed through seven site visits. Each visit included walking in different parts of the case study area to appreciate the variations in landscape and functions. Mapping and photographing were used to document the characteristics of the scenery and architecture, public spaces and important landmarks, and spots for different activities (Map 3). The visits were arranged on different days of the week and different times of the day to form an idea of changing activities taking place. Additionally, traffic was counted on three occasions to get a grip on the intensity of traffic on the main road going through the area (Figure 11). The main characteristics of Chuini are portrayed in Figure 12.






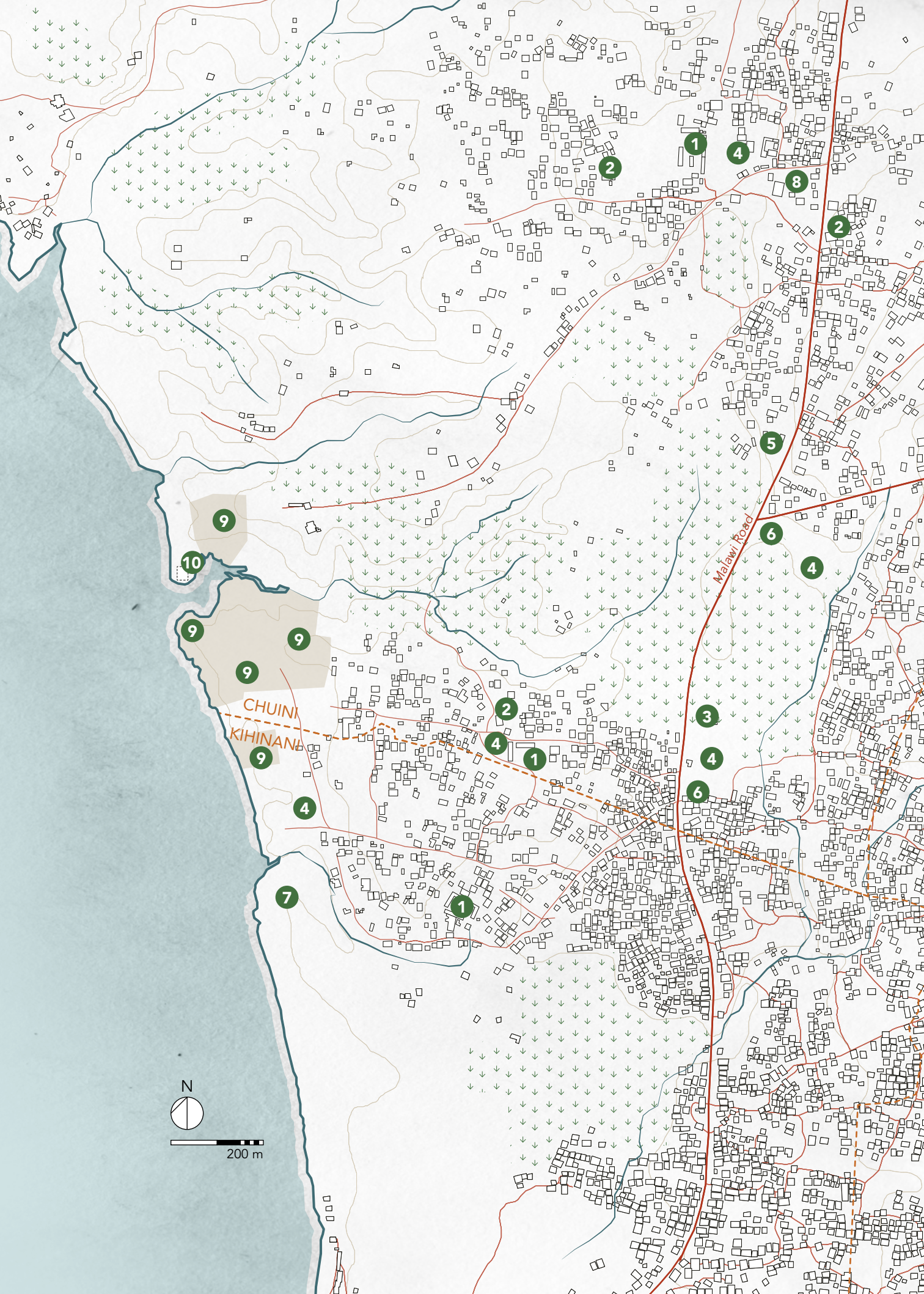
TRAFFIC COUNTING ON MALAWI ROAD					
					
Monday 3.00 pm	17	15	35	42	39
Thursday 6.30 pm	18	13	55	49	37
Sunday 12.00 am	10	20	42	36	40
average	15	16	38	42	39

Figure 11. Traffic counting on Malawi Road in Chuini. Red illustrates the busiest hour for each means of transport and green shows the average of each to make comparison between them easier. While walking is the most popular means of transport in Zanzibar, this counting exercise illustrates how poor the pedestrian access is along the main road running through Chuini.



MAIN CHARACTERISTICS OF CHUINI



PROXIMITY TO THE OCEAN is the defining character of Chuini. There are varying activities taking place on the beach on different times of the day. The small fishing harbour is busy in the morning, when boats come back from the sea. Fish is carried to dry to the fields covered with plastic next to the beach but there are no proper facilities for these activities. The beach is also popular for playing sports and working out when the tide is low. During high tide there is not much sand on the beach, but it is perfect for swimming.



AGRICULTURAL ACTIVITIES AND NATURE are another prominent feature in Chuini's landscape. There used to be vast rice fields in the area, but today the selection of crops is more diverse. Fertile land stretches on both sides of Malawi Road and the landscape becomes more rural towards the north. Particularly in the northern part there is plenty of untouched greenery amidst the cultivated land and residential areas. There are also smaller plots scattered inside the housing areas. Most of the green area is wetland and there are three major streams that run through the area.



TRAFFIC is busy on Malawi Road throughout the week (Figure 11). Most popular means of transport are motorcycles, *dala dalas* (Zanzibari public transport), and private cars. Pedestrians and cyclists mostly avoid the main road due to lack of safe sidewalk and the dusty air. The road is paved but it is in poor condition. Smaller roads connect the residential areas to the main road, most of them unpaved. Some roads are wide enough for car access but the further from the main road, the narrower the pathways become.



HOUSING AREAS are characterised by simple *Swahili houses*⁴ built of cement bricks for walls and corrugated metal sheets for roofing. The facades are very rarely painted. Streets between houses are narrow and mostly only accessible for pedestrians. The housing areas are informal settlements by definition. City infrastructure (running water, electricity, street lighting, drainage, and sewerage) is lacking and the area is rapidly growing. There are almost as many unfinished foundations for new houses as there are finished buildings.

Figure 12. Main characteristics of Chuini.

PUBLIC SERVICES are limited in Chuini. There are two big public schools, one in each *shehia*, and a few *madrasas* (Islamic schools). The schools are already crowded, and future population growth means increased need for schools. There are a few mosques, one of them recently finished beside Malawi Road in the north. There are some small local clinics, but main health services are in the town centre. There are no public spaces for gathering and community events.



COMMERCIAL ACTIVITIES are focused in two areas. In the southern part next to the big field there is a market, where mostly fish is sold. The structures are temporary. Next to the market along the road to the south there are many small shops selling food supplies, household items, and hardware. There are also services like hair salons and car wash. In the northern part next to the main bus stop there is another small market with fruit, plants, and vegetables available.



RECREATIONAL ACTIVITIES comprise mainly football and playing other sports or chatting with neighbours on a *baraza*⁵ or anywhere there is shade, usually provided by trees. Football fields are simple open areas with no specific facilities. Sometimes there are car tyres marking the perimeter and serving as seating. The fields also serve as the place for bigger festivities for the community.



WASTE is a visible problem in Chuini. There are no sorting points nor structured waste collection which has resulted in unofficial dumping sites. Some of the sites lie next to waterways, which poses a risk of spreading the trash in a larger area and all the way to the ocean. Improper waste disposal is also a health risk and may encourage spreading waterborne diseases.



4 Swahili house. Typically a one-family-house consisting of a corridor with attached rooms; more public spaces close to the front door and private spaces like bedrooms, bathroom, and kitchen in the back.

5 Baraza. A bench integrated in the front facade of a Swahili house; semi-public space, where anyone can sit down. Refers also to seating areas in public places.

5.3 Results from the inhabitant and stakeholder engagement

As presented in the introduction of this thesis, a set of methods were chosen to engage inhabitants in Chuini and other stakeholders in Zanzibar. This part of the chapter presents the results of utilising these methods.

5.3.1 Design probing

To engage the inhabitants living in Chuini, I chose design probing, a method borrowed from the product design discipline. I designed simple probe kits (Figure 13) with the intention of getting to understand how Chuini's inhabitants perceive their environment. With the help of the DoURP we contacted the *sheha* (the head of a *shehia*) of Kihinani, who chose 15 households that would take part in the probing exercise.

We discussed the best method of delivering the probe kits with the local research assistant, Ali Haji Khamis from DoURP. Based on previous experiences in Ng'ambo, we did not want to deliver the probe kits in a group meeting to avoid excessive peer influence but decided to try and deliver them individually to each household. We delivered the kits together with Ali Haji Khamis who also translated the discussions. We walked from house to house and presented each participant with a kit. With the help of the research assistant and the *sheha*'s assistant, we explained the contents of the kit and why we wanted them to participate in such an exercise.

Upon delivery, it was difficult for me to control the situation due to my lacking language skills in Kiswahili. My interpretation was that some of the participants received excessively detailed instructions on how to fill in the cards, and it is hard to evaluate whether this influenced the responses. Some of the participants also became aware of each other and discussed the kits together, so the kits could have been delivered in a meeting to save time and ensure coherent instructions to everyone. Despite the original intention, we did not manage to deliver all the kits personally, because members of the *shehia* committee took a couple of kits to be delivered to inhabitants living a little further away.

"Every human being wants a place to live."

— Farmer, 63

The participants got five days to complete the probing exercises and to return their kits to the *sheha*. Altogether ten kits were returned, and we picked them up after the deadline. The kits were returned by three women and five men aged 40–68, and two partici-

pants who did not share their personal details. The impact of the *sheha*'s involvement is hard to assess but it probably encouraged people to respond to the probes. It also might have pressured them to respond in a certain way, but I work on the assumption that each participant answered the questions uninfluenced by others. Some of the participants were also part of the *shehia* committee, but due to anonymity I do not know the exact number.

Regardless of the aforementioned shortcomings, the answers conveyed some thoughts and feelings of the inhabitants of Chuini and helped to empathise with the inhabitants in the design process. I studied the answers carefully but chose not to count or summarise them to emphasise their role as inspiration rather than information. Some themes and associations did come up more frequently, though, whereas for example some colours stirred quite opposite associations.

"I think that we should take care of our environment."

— Farmer, 52

The answers showed that red symbolises love and harmony to some and blood and danger to others. Yellow is associated with, for instance, economy and minerals. Green and blue are the colours of nature and the participants would like their environment to be preserved as it is an essential part of their neighbourhood. The words raised concerns for the uncontrolled urban sprawl in Chuini and how it has resulted in the destruction of the natural environment and the loss of agricultural land. The photos made the participants hope for modern homes and services in Chuini. Additionally, the participants addressed challenges such as the lack of proper waste disposal and the risk of spreading water-borne diseases and hoped for new opportunities for employment as well as the preservation of existing livelihoods.

DESIGN PROBE KITS

INTRODUCTION, INSTRUCTIONS, AND A BLUE PEN

Each kit contained a card with a short introduction of what is the purpose of the kit, instructions on what to do with the kit, and a pen.

CARD SET 1

When you think of your neighbourhood what comes to your mind first when you think of the colour *green / blue / red / yellow / white* ?

CARD SET 2

When you think of Chuini what comes to your mind first when you think of the word *city / house / home / people / water* ?

CARD SET 3

When you think of your everyday life what comes to your mind first when you look at the picture on the other side of this card?



All material was provided both in Kiswahili and in English.

Figure 13. Contents of the design probe kits. The design probe kits and responses are described in more detail in Appendix III.

5.3.2 Workshop with secondary school children

We had the opportunity to organise a workshop in a school in Chuini together with two students attending the Interplay of Cultures studio, Belén German Blanco and Korbinian Schütze. We were accompanied by Ali Haji Khamis from DoURP and Fatma Hamad Shehe from the State University of Zanzibar. Together with Belén and Korbinian we planned four tasks that we carried out with 9 girls and 10 boys aged 10–14, while Fatma and Ali translated. Tasks are written out in Figure 14. The aim of the workshop was to give a voice to the future inhabitants of Zanzibar Town and get another perspective to how people in Chuini perceive their surroundings.

In the first task we asked the children to choose the city they liked the most out of 12 images from cities around the world. Everyone was handed a sticker note to write down the number of their preferred city. Themes that they mentioned catching their attention included presence of trees and water, modern transportation like buses, cars and trams, high and modern buildings, and colours and ornaments in buildings. In general, the children did not seem to favour aspects familiar to them.

In the second task we handed six pairs of images to the children who were divided in teams of two. We then asked them to choose which one they preferred of each pair. The pictures depicted qualities of public indoor and outdoor spaces. The children seemed attracted to modern qualities, choosing for example laptops over books, and artificial shading structures over canopies of trees. A picture of street lighting might have gained votes, because that is something that is missing in Chuini.

In the first drawing exercise the children drew their path from school to home. We asked them to identify something they particularly liked and something they did not like on the way and mark it with stickers. Some common themes in the drawings were public spaces such as mosques, *madradas*, and football fields, and points of orientation like specific trees, crossings, and streets. Trash was drawn and marked as disliked in over half of the drawings.

In the second drawing exercise the children were asked to draw their dream house. Almost all houses had a typical Swahili style ridge roof. Some drawings showed the insides of the house either in plan or in section. There were often greenery or animals in the yard, and some vehicles, too. All the houses hosted several bedrooms and living spaces.

Our interpretations of the drawings and generally of the results of the exercises rely mostly on second-hand impressions instead of really understanding the reasoning behind each choice and the meaning of the drawings. To minimise misinterpretations, it would have been valuable to arrange a discussion with the participants after each task. This would have required less tasks and a smaller group of children to maintain their focus and to be able to control the situation better. The chance to arrange a workshop also presented itself with a short notice and left a limited time to prepare the tasks. The tasks would have been more cohesive if more time could have been invested in



WORKSHOP TASKS

TASK 1

Choose the city you like the most out of 12 images from different cities around the world, both rural and urban.

TASK 2

Choose the preferred image of 6 pairs of photographs depicting different qualities of urban spaces and activities.

TASK 3

Draw your path from school to home and mark something you specifically like and something you do not like with stickers provided.

TASK 4

Draw your dream home.

Figure 14. Instructions for the school workshop. The results are presented in Appendix IV.

planning them. Despite these places for improvement, the workshop provided precious pieces of information about the children's preferences, and how they observe their surroundings. The children also seemed to enjoy the tasks and were delighted to get to keep their artwork, which was only photographed for documentation at the end of the workshop.

5.3.3 Semi-structured stakeholder interviews

Altogether 7 interviews were carried out during the field trip. The interviewees were suggested by the Director of the Department of Urban and Rural Planning, and most of the interviews were arranged together with the students of the Interplay of Cultures course. Interviewees were first asked to describe their work and organisation and were then asked questions that were related to their field of expertise and issues of housing, urban design, and environmental and social challenges. All information provided in the interviews is collected in Appendix V.

The first interview was with the director of the West A Municipality, Amour Ali Mussa. The island of Unguja is divided in three regions: Urban/West Region (which is divided into three municipalities: West A, West B, and Urban Municipality), and North Region and Central/South Region, both of which are divided in districts. Chuini falls under the authority of West A municipality in Urban/West Region. There are altogether 34 *shehias* in West A Municipality.

The municipalities in Zanzibar are responsible for the local governance and ensuring peace and security. Education, agriculture, and healthcare are their primary responsibilities. According to the director, people in Chuini would like to have a traditional market like in the other parts of the town, but the municipality wants to develop a shopping mall with funding from the World Bank. The director found young people to be the biggest challenge in the development of Chuini, because they oppose development if it means they will lose their football fields or have to walk further to play. He felt that the shopping centre would give more possibilities for the young people as well.

According to the municipality director, there is no flooding in Chuini and agriculture in the area is no longer profitable. Instead, he wants to offer the residents the opportunity to start their business in the shopping centre, which he thinks will offer them greater financial profit. People who lose their livelihood due to development in the area will be given priority when spots in the shopping centre will be distributed.

There are around 400 *dala dalas* and trucks going through Chuini daily, so there is a real need to replace the existing informal *dala dala* stop with a proper bus terminal. The municipality is also planning to locate a hospital especially for women and children close to Chuini and it is currently under construction (Image 11).

The second interview was with the director of Zanzibar Housing Corporation, Riziki J. Salim. According to her, the biggest challenges are acquisition of land and importing materials, because the taxes are remarkably high. Constructing multi-storey affordable



Image 11. *Hospital under construction in West A Municipality east of Chuini.*

housing is extremely difficult, because materials for concrete are expensive and sand is an extremely limited resource. Affordable housing is easiest, when it is one-storey, but there is not enough space in the city to respond to the urbanisation and population growth with one-storey construction only.

An average Zanzibari family today consists of parents and three children (quite often still more) and homes are generally shared with the extended family. New apartments should be at minimum two-bedroom apartments, plus living room, and kitchen. Master bedrooms (with attached bathroom) are valued by people, but people's wishes are not in line with what they can afford, according to Salim. Kitchen is preferred to be a separate room with a connection to an outdoor space. Entrance to an apartment is often straight to the living room without a specific space for leaving clothes or shoes.

"To change the mindset of people is a big challenge."

— Riziki J. Salim

According to the director, people do not mind living in multi-storey houses, although interviews have often shown otherwise. Some people definitely prefer living in a single-family one-storey house. People do not like sharing spaces or facilities due to cultural reasons and because they believe that a shared space would lack maintenance and mutual responsibility to keep it clean. Some outdoor spaces like a playground for children could be shared.

The third interview was with the director of Angoza (Association for Non-Governmental Organisations in Zanzibar), Asha Aboud. The aim of Angoza is to build capacity and share information with its members and to organise dialog between the organisations and government officials. Currently the most urgent need for both Angoza and the member organisations is space for their activities, because it is difficult to work comfortably and efficiently if there is no place to work.

Accessibility is a big and unaddressed issue in urban space in Zanzibar. It is very hazardous for people with limited eyesight to move about in the city, because the traffic is so chaotic. According to the director, public toilets need to be accessible to all, including people with disabilities. To improve safety, it is good to have an attendant working at the location, to also take care of

"We can't favour men without favouring women."

— Asha Aboud

cleaning the facilities and taking payments. Concerning housing, the director said that any individual or organisation willing to construct a house in Zanzibar must follow a strategy for accessibility for people with disabilities. Street lighting is also an essential element in the city to make women feel safer during dark hours. The needs of women, children and disabled people need to be considered in urban design and planning. There are few mosques that allow women to come in and pray. Most women pray at home but would like to be able to pray also elsewhere.

The fourth interview was with a representative from Reclaiming Women's Space, Munira Said. The association aims at civil society participation and heritage conservation. According to the interviewee, men and women are traditionally separated in space in Muslim culture. There used to be plenty of spaces in Stone Town exclusively for women, like a specific area on the beach, but now they are lost, mainly due to tourism taking up more space in the city. According to Said, interaction between genders is not prohibited by religion, but many prefer spending time with their own gender, nevertheless. She claims that it is an advantage for women to pray at home, because they have so many domestic responsibilities.

The fifth interview was with the director of Zanzibar Water Authority (ZAWA), Muhammed Ilyasa Muhammed. ZAWA is mandated to carry out all water supply and

"Water is life."

— Muhammed I. Muhammed

water resource management issues in Zanzibar, both Unguja and Pemba. According to the director, green areas are crucial in maintaining the aquifers in Zanzibar. Basins and wetlands harvest rainwater and recharge the groundwater sources. Sand

layers will filter most of the contamination that stems from the surface, but chemicals pose a severe problem.

According to the director, there is a strong connection between agriculture and rainwater: irrigation from streams or groundwater is always needed during the dry seasons. Rainwater harvesting could be one solution to water scarcity. Water sources need to be protected and the surroundings need to be paved with permeable materials or planted with greenery. Ideally there would be a 100-metre radius of buffer zone around each water source, but many exceptions are made on that, and in reality, it ranges between 20–50 metres. Housing should be located lower than the water source, whenever possible. In Chuini area there is only one borehole in use at the moment. There are some other holes that currently stand idle, and will be taken into use, if necessary. A buffer zone should be left around each borehole.

The sixth interview was with the director general of Zanzibar Environmental Management Authority (ZEMA), Sheha M. Juma, and the director of the Department of Environment (DoE) Farhat M. Mbarouk. ZEMA and DoE are responsible for environmental monitoring, environmental impact assessment (EIA) of proposed developments, dealing with climate change issues and delivering environmental education and research.

Informal settlements cause flooding but 80% of flooding issues could be solved through proper drainage. Informal settlements also cause a threat to water catchment areas, disabling recharge of groundwater sources. Sea level rise causes both saltwater intrusion and inundation in Zanzibar. In some areas people have had to be relocated, because agricultural land has deteriorated so badly.

The disposal of waste in Zanzibar is currently not environmentally friendly. Waste management from collection to sorting and recycling should be better designed. There is a pilot project for composting in four areas, where the sorting is started in the households. Biodegradable waste is taken to make compost and the rest ends up in landfill. Composting is also an income generating activity.

The seventh interview was with the director of the Department of Urban and Rural Planning (DoURP), Dr. Muhammad Juma Muhammad. DoURP has a vision of Zanzibar as the most sustainable city in Africa. According to Dr. Juma, this requires quality over quantity. Sustainability for him means taking care of the environment, mitigating the effects of climate change, and preserving the culture of Zanzibar. Chuini should be developed following this vision, preserving the environment that is prominent there and offering public spaces where people would enjoy spending their time.

Urban sprawl has forced the government to develop areas that could otherwise have been left in their natural state. To stop the sprawl, it needs to be considered a threat. Dr. Juma urges that the government must provide housing, because the informal settlements have emerged from the people's need of shelter. The economic situation is the biggest challenge to be able to build affordable housing.

5.4 Assessment of the environmental impact of the field trip

Carrying out research or designing in a foreign culture require particular sensitivity for the projects to be successful for all parties involved. I have studied this topic previously in my bachelor's thesis (Suomela, 2015; written in Finnish), where I concluded that carrying out a successful project in a developing country requires considering the local climate; social relations; religion, customs, and taboos; availability of materials; sanitation; gender equality; participation of the users; and political and economic realities. These were all aspects I tried to address to the best of my ability in my field work and in the design process presented in this thesis. However, as in this thesis I am calling for global sustainability especially from the point of view of the natural environment, here I would like to briefly focus on the ecological impact the field trip had.

As pointed out earlier in Chapter 4, tourism in Zanzibar results in detrimental land-use change threatening vulnerable coastal and marine habitats, consumes a significant amount of the scarce water resources on the island, and produces waste that cannot be properly processed locally. Even though I tried to make as many environmentally friendly choices along the way as I could, I participated in exacerbating these problems by merely arriving on the island as a foreigner. To limit the impact during my stay I took measures that included taking only short, cold showers, not having air conditioning in my bedroom, bringing a water filter for purifying drinking water, and bringing all trash that I produced back home with me. I used public transport whenever the distance was too long to walk but did not dare to mount a bicycle — safe pedestrian and cycling ways are urgently needed to support a sustainable transit system in the growing city.

In addition to the challenges inflicted locally in Zanzibar, doing research in a distant location from home causes global effects as well. Estimations of the greenhouse gas emissions of my flights between Zanzibar and Helsinki are collected in Figure 15. Comparing the estimation average with the average carbon footprint of a Tanzanian (Zanzibar specific data is not available), which is 0,256 t CO₂ (Muntean, et al., 2018), my flights caused tenfold the emissions of an average Tanzanian during an entire year. No amount of emission compensation fees justifies this. Conducting research or realising architectural projects far away from home requires providing a larger handprint — a positive impact — to try and compensate the negative impact of the ecological footprint.



CARBON FOOTPRINT ESTIMATION HEL – ZNZ – HEL

3,565 t CO₂e according to *atmosfair.de*

3,267 t CO₂e according to *co2.myclimate.org*

2,760 t CO₂e according to *offsetters.ca*

2,320 t CO₂e according to *calculator.carbonfootprint.com*

1,180 t CO₂e according to *icao.int*

average estimate of carbon footprint for flights HEL–ZNZ–HEL

2,618 t CO₂e

average carbon footprint of a Tanzanian resident

0,256 t CO₂e / year



Figure 15. Comparing the carbon footprint of flying from Finland to Zanzibar and back and that of an average Tanzanian resident paints a grotesque picture. The image portrays the Zanzibari coastline photographed from an airplane.



Image 12. *Different layers of current activities in Chuini, Zanzibar Town.*

5.5 Conclusion

After studying the current situation and future projections in Zanzibar, looking into existing plans, and carrying out the field work, certain needs stood out. Many of the needs expressed by different stakeholders in the interviews, design probe responses, and the school workshop were overlapping, but some were contradictory. The needs are listed in Figure 16. Listed are also some of the aspects that should be considered in the development of Chuini to ensure the resilience and future sustainability of the area. In addition to these, infrastructure, e.g. sewerage and drainage, needs to be improved in the area, but require technical knowledge outside of the scope of this thesis. This list does not pretend to be exhaustive but points out some of the most prominent factors that caught my attention. Different methods and a different premise for the research might have produced a different list with different priorities. Chapter 6 will provide examples of how these aspects could be translated into resilient urban design in Chuini.

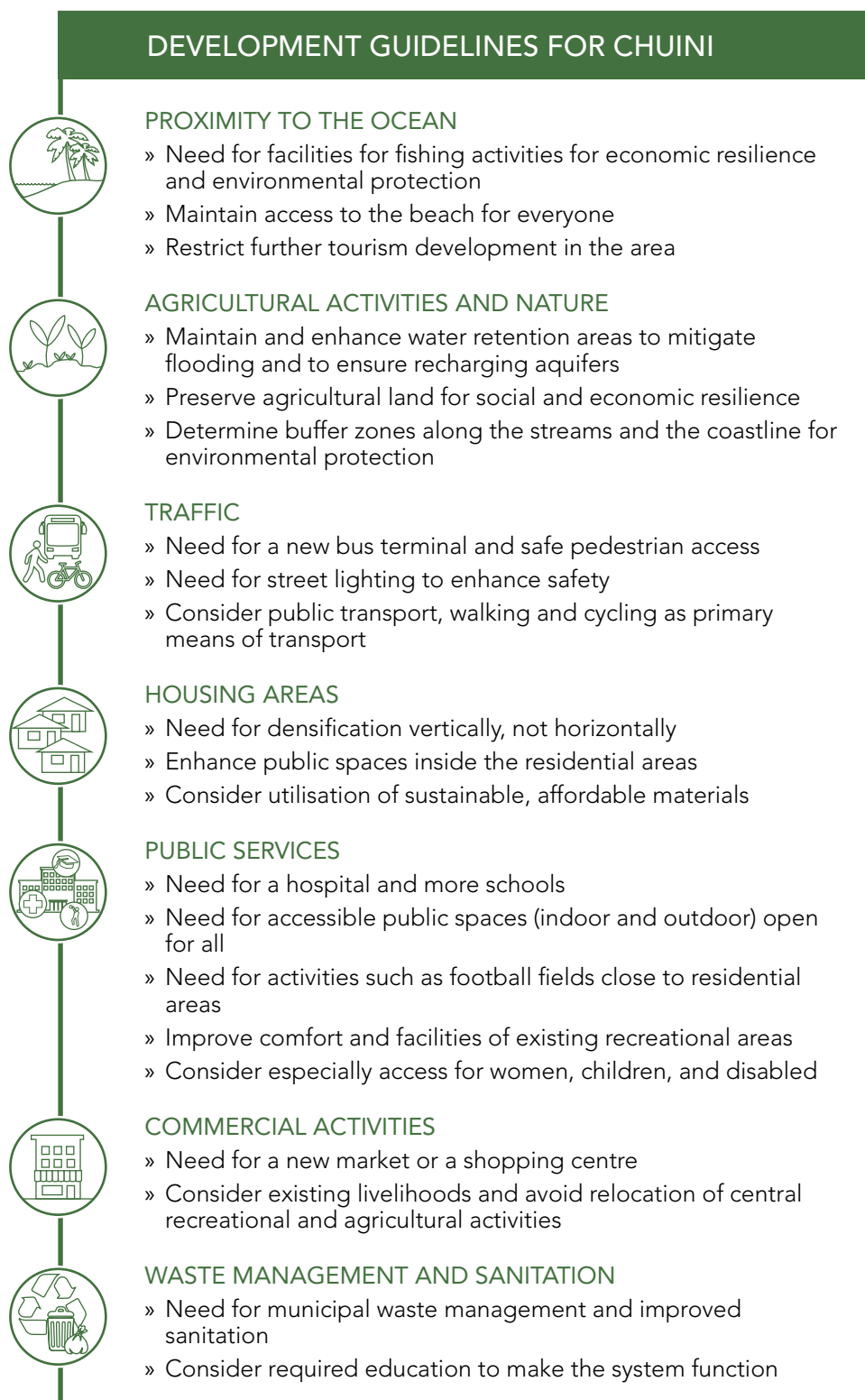


Figure 16. Development guidelines for Chuini based on the site analysis, field observations and stakeholder engagement.



chapter 6

THE MEANS: DEVELOPING A RESILIENT URBAN CENTRE IN CHUINI

*"If we don't plan Chuini,
the people will plan it."*

— Dr. Muhammad Juma

*An aerial view of Chuini where the residential areas are continuously growing.
Drone image by Zanzibar Mapping Initiative.*

Based on the theories of sustainability and resilience, this chapter presents a development framework for building urban resilience, which consists of a planning hierarchy and six principles of resilience thinking to apply through every step of the planning. This chapter also illustrates the application of the framework in the context of Chuini in Zanzibar Town, based on the extensive site analysis and the engagement methods presented in the previous chapter.

6.1 Improving resilience with urban design

Urban areas must be developed to be more resilient to endure the unexpected changes in the future. Through improving their resilience, cities will also contribute to enhanced sustainability. As a result of this thesis I present here the development framework for urban resilience, which consists of a planning hierarchy and principles of applying resilience thinking throughout the planning process (Figure 17). The planning hierarchy comprises three steps to build a resilient social-ecological system: prioritising ecological components, connecting social components, and complementing the system with economic components. Ecological sustainability is the precondition for the whole framework and thus all urban design solutions must meet the requirements for resilient urban design set in Chapter 3.

The first step is identifying ecological vulnerabilities and defining areas to be protected to support biodiversity and to ensure future ecosystem service provision. This includes considering aspects such as habitat diversity, flood mitigation capability, storm water management, and general health and enjoyability of the environment. Based on this analysis, an ecological network can be composed to form the backbone for the system.

The second step is localising the existing and potential social activities and analysing their connectedness. This means for instance considering the connectivity inside and between residential areas to create safe and stimulating urban spaces and prioritising walking and cycling as means of transport. Based on the analysis, a social network of routes and nodes with public indoor and outdoor spaces, services, and residential areas can be created to support accessibility and human well-being.

The third step is identifying the existing and potential areas for economic activities. This includes analysing the connectivity and diversity of activities, and the availability or scarcity of required infrastructure. Based on these findings, an economic network can be designed to support livelihoods, economic activity, and mobility inside the area and connected to the surrounding parts of the city.

Principles for resilient urban design should be applied through every step of the process. The six principles listed in Figure 17 are compiled based on the ones presented in Chapter 3 by Biggs (2012) and Ahern (2011). Certain principles were left out because they are not in the scope of urban design and planning. For instance, polycentric governance systems, although important in improving resilience in social-ecological systems, cannot be directly promoted by urban design.

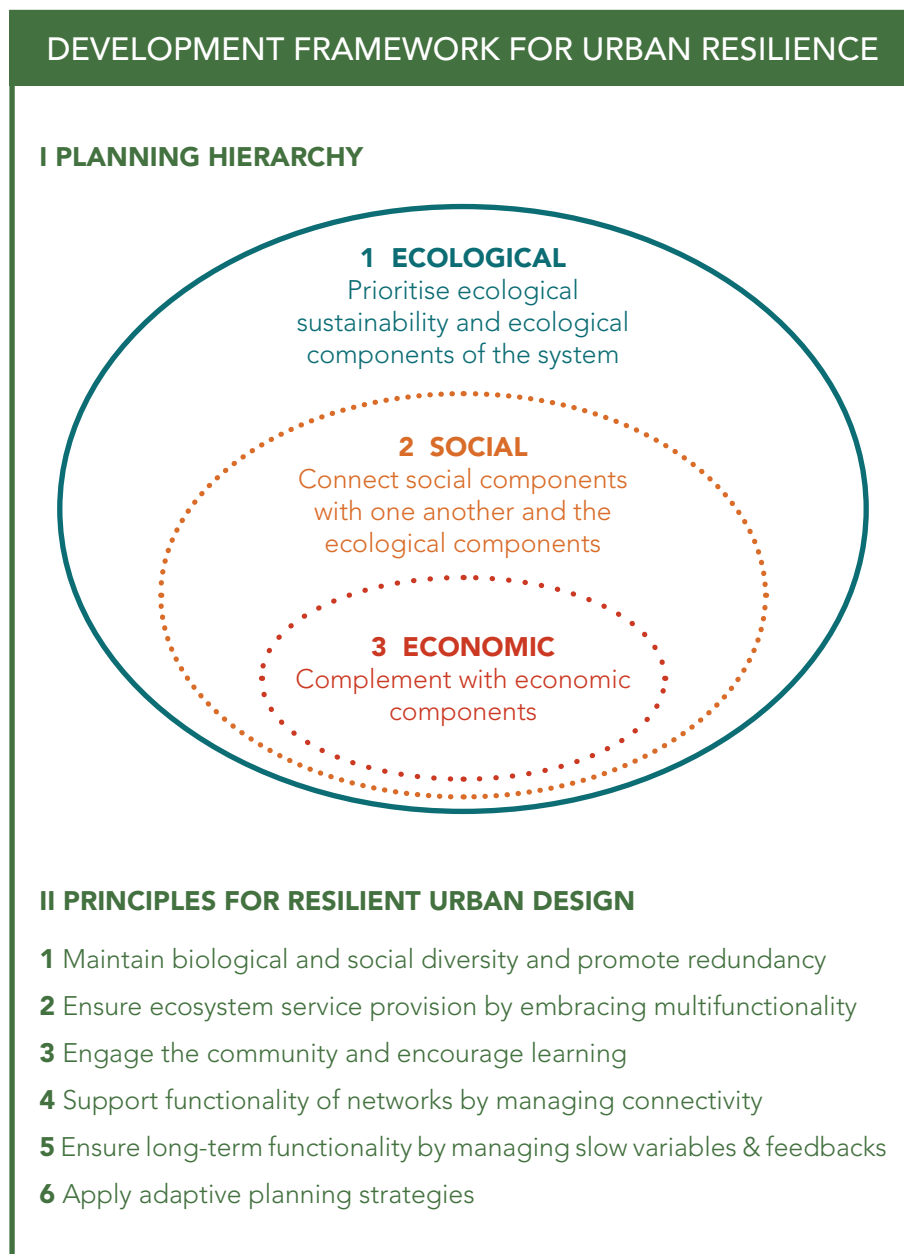


Figure 17. Development framework for urban resilience. The nested components of sustainability translate into a planning hierarchy that guides urban design and planning to develop ecologically and socially resilient and sustainable cities. The principles for resilient urban design should be applied on every step of the planning hierarchy. The principles are compiled from the five strategies to foster urban resilience by Ahern (2011) and seven principles to apply resilience thinking in social-ecological systems by Biggs et al. (2012).

6.2 Applying the development framework in Chuini

The following pages present the development framework in action in the case study area of Chuini. Following the planning hierarchy results in three overlapping and connected networks — the ecological, social, and economic networks — that together form the future resilient urban centre in Chuini. The principles for resilient urban design are applied in the design of each network.

The design proposal strives to enhance existing qualities in Chuini instead of demolishing with a clear focus on resilience. Thus, the proposal does not completely solve the challenges of the rapid population growth or the densification dilemma but offers preconditions for further development in which these challenges can be tackled. It also offers tools to improve ecological and social resilience by urban design and illustrates concepts for developing typical areas in Chuini.

The site analysis lays a solid foundation for the proposed actions, and information from the interviews and inspiration from the design probing and school workshop are utilised. The proposal is based on the existing fabric of routes and residential areas which have been created spontaneously and intuitively by the inhabitants of Chuini. The proposal considers the various stakeholder needs, expressed in the community engagement, through suggesting a diversity of services and activities in the area, enhancing the existing connectivity, and proposing multifunctional spaces — everything with the aim of improving resilience.

THE DEVELOPMENT FRAMEWORK IN CHUINI



The three networks are first presented individually, which enables illustrating how the networks build on one another. Each layer also responds to different aspects presented in the conclusion of the site analysis in Chapter 5 (see Figure 16). Next, the networks are overlaid to portray the resilient social-ecological system that they constitute. Finally, the resilience and urban design solutions are illustrated in more detailed, although still conceptual, plans of nodes within the networks.

All maps and figures on the following pages are made by the author. Base map for Chuini was provided by the Department of Urban and Rural Planning in Zanzibar.



Image 13. Chuini — starting point. Drone image by Zanzibar Mapping Initiative

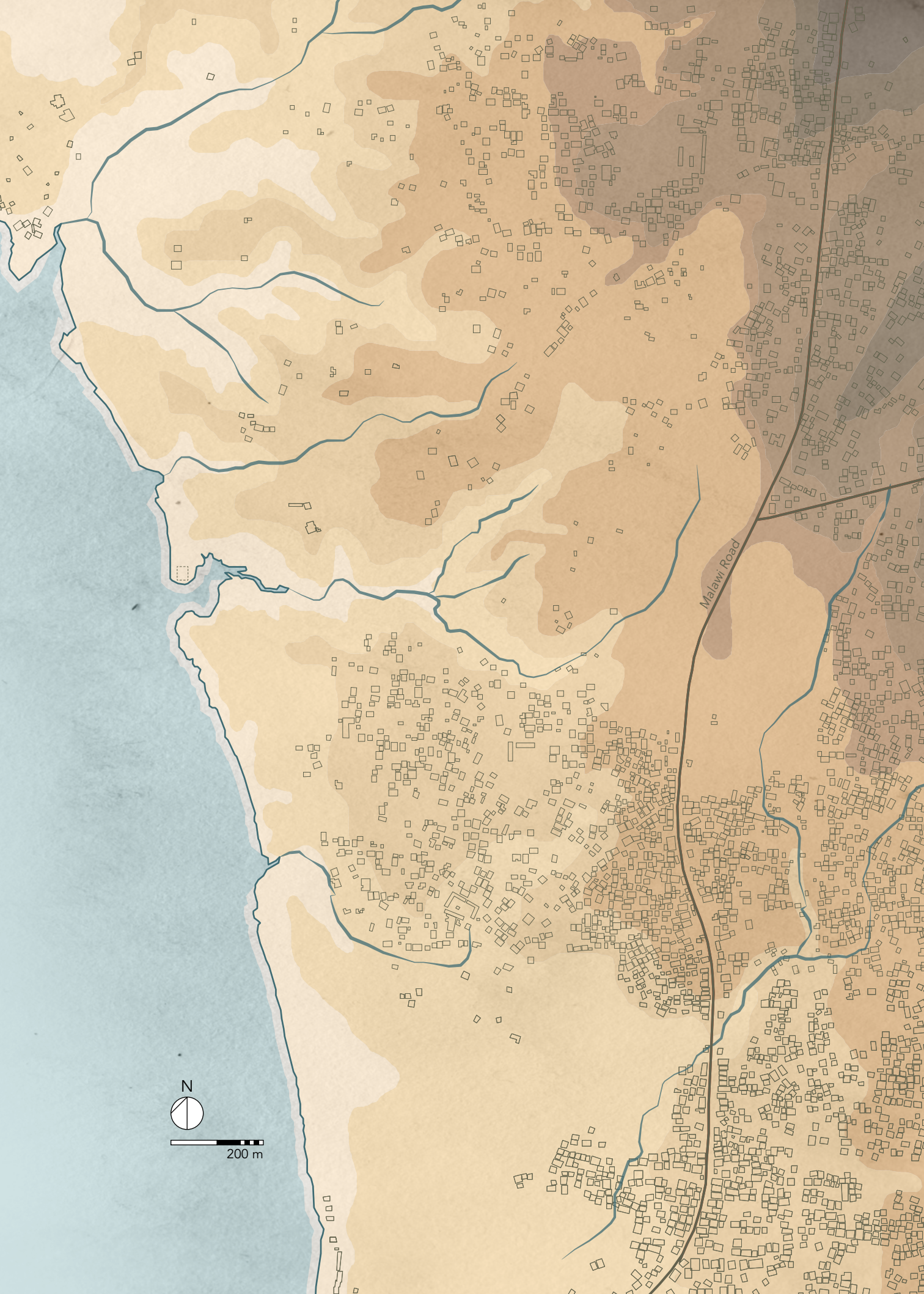


Map 4. Analysis — topographical map

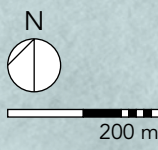
1:10 000



The topography in Chuini is relatively flat. The area is not in immediate danger due to sea level rise because the seaside banks are rather steep and high. Erosion is a threat, however, as there is not very much protective vegetation along the beach. Inundation also has an access inland through the streams which run in low-lying areas.





Malawi Road



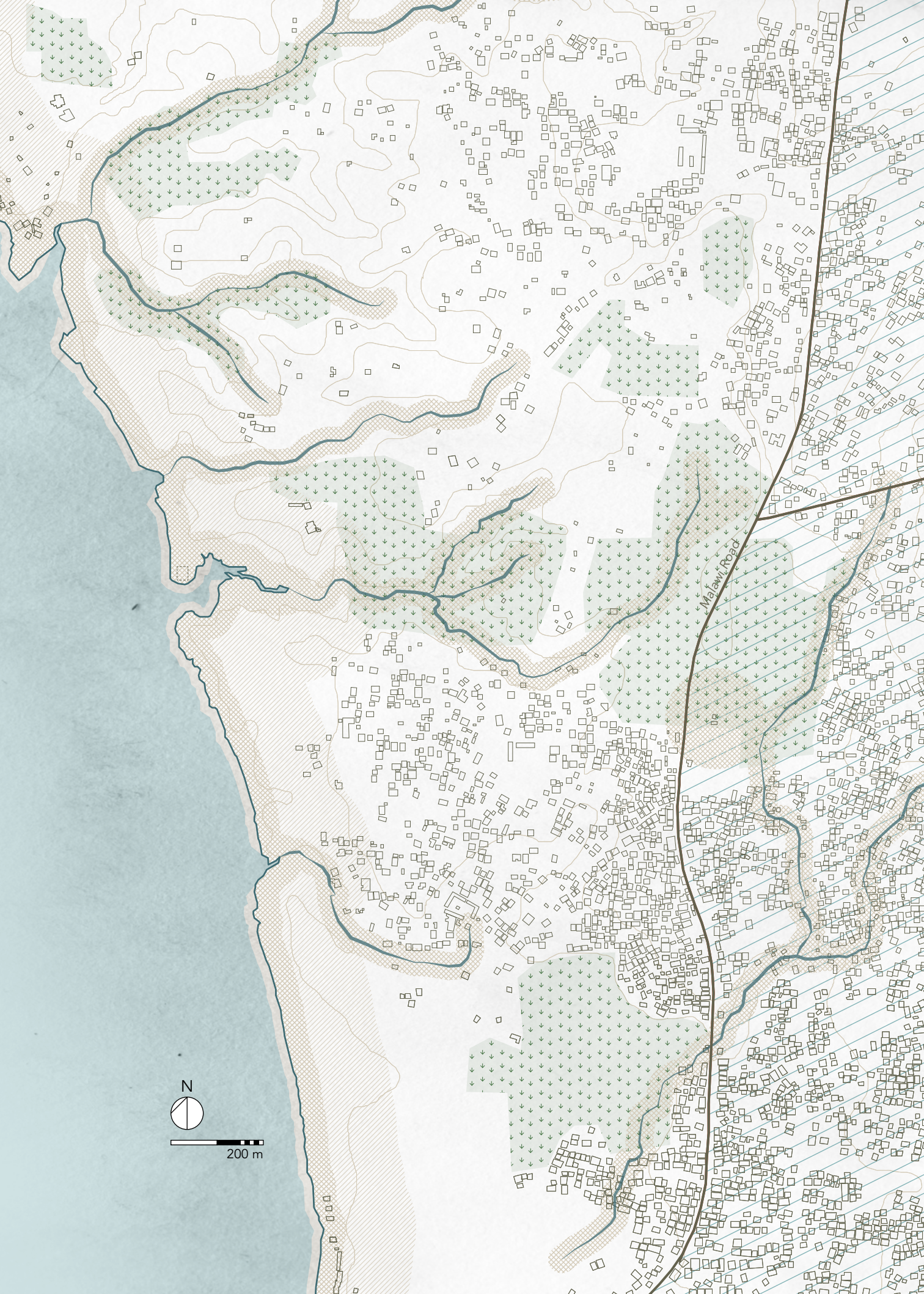


Map 5. Analysis — existing sensitive areas and development restrictions

1:10 000

	Development prohibited		Main road
	Development subject to EIA		Stream
	Sensitive area: aquifer		Contour line, 5 metres
	Sensitive area: agricultural land		Building

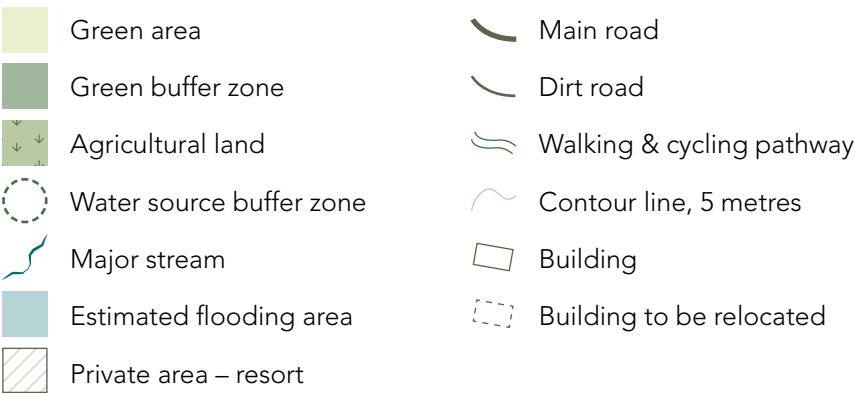
Development is prohibited 50 metres from the coastline and in a 30-metre perimeter from the streams. Proposals within 200 metres from the coastline are subject to environmental impact assessment (EIA). A 100-metre perimeter around the groundwater bore hole must be maintained unconstructed. (Restriction guidelines from ZanPlan 2015; map by the author.) On one hand, these restrictions help protect water sources from contamination and water-fronts from erosion, and on the other hand, they protect buildings from floods.





Map 6. Chuini — new ecological network

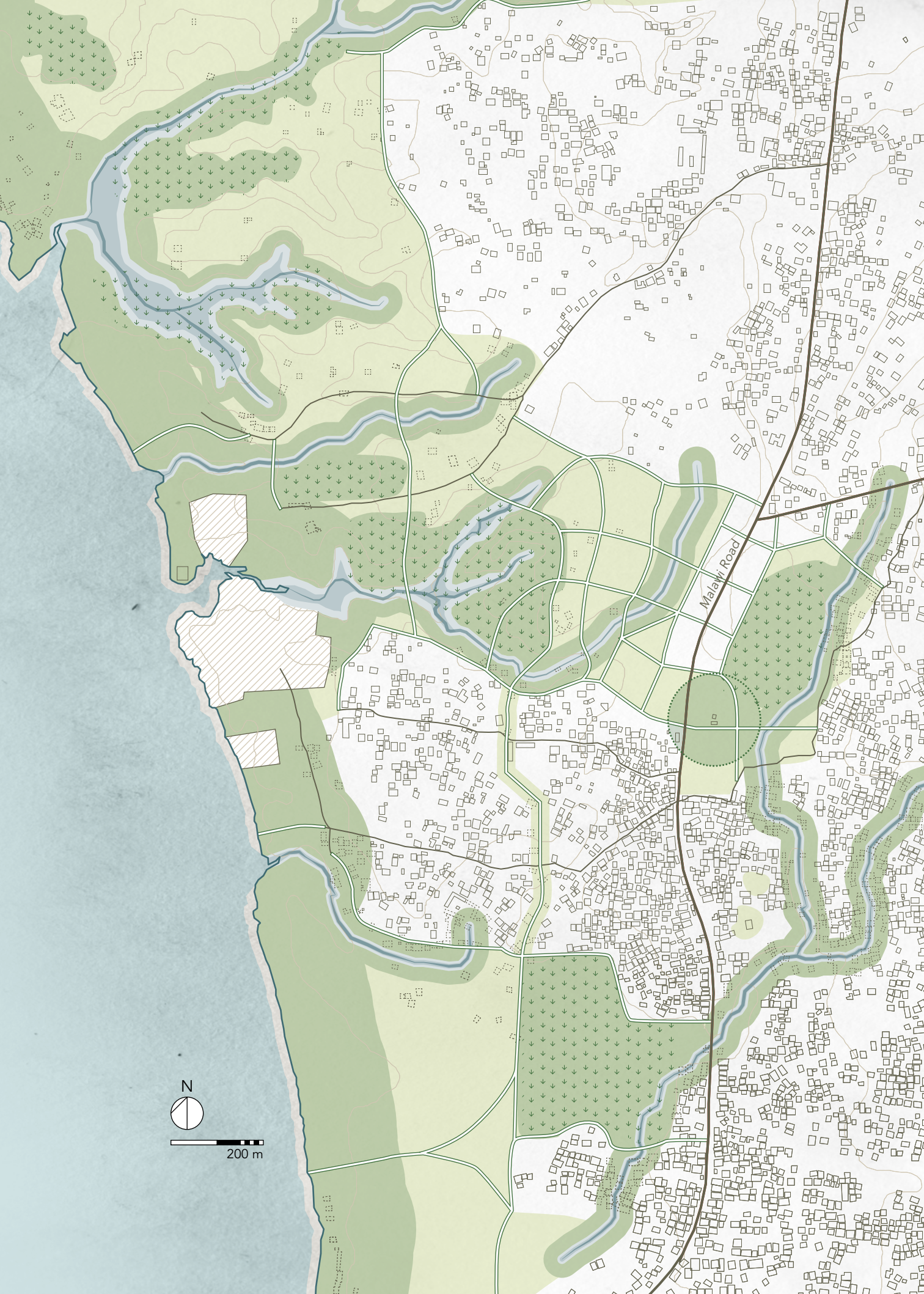
1:10 000



Prioritising ecological sustainability defines areas to be preserved and enhanced to protect the environmental values in Chuini. These areas are connected to create the ecological network built upon the existing water bodies and green zones in Chuini. The network ensures future ecosystem service provision and the preservation of biodiversity, as well as the safety and well-being of the residents in the area.

The ecological network follows the development restrictions proposed in ZanPlan by creating green buffer zones along the beach and the streams. The majority of the existing agricultural land is also protected to leave the most vulnerable areas unconstructed and to maintain the prevalent livelihood in Chuini. Because construction is prohibited in the buffer zones and the preserved agricultural land, some of the existing buildings must be relocated into the residential areas.

Flooding areas are estimated based on contour lines. Sea level rise is expected to have the greatest impact along the streams, and not on the coastline, as the beachfront is rather steep. The ecological network preserves large green zones to support carbon sequestration and flood mitigation. Flood mitigation is further considered by creating systems, such as bioswales and retention ponds, that complement technical storm water management (see Figure 18 for more solutions).





TOOLBOX FOR ECOLOGICAL RESILIENCE

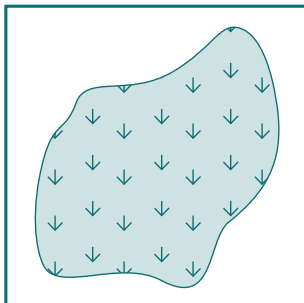
IMPROVING GENERAL ECOLOGICAL RESILIENCE



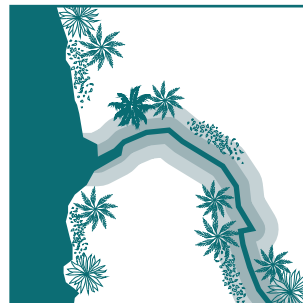
PRESERVE GREEN AREAS
IN THEIR NATURAL STATE
FOR BIODIVERSITY



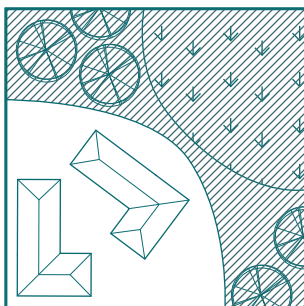
ASSIGN BUFFER ZONES
ALONG WATERFRONTS



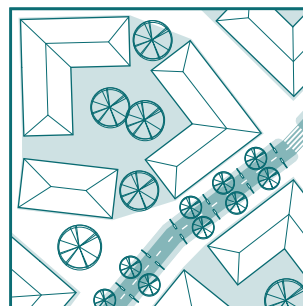
PRESERVE AGRICULTURAL
LAND FOR FARMING



REVEGETATE
WATERFRONTS
AGAINST EROSION

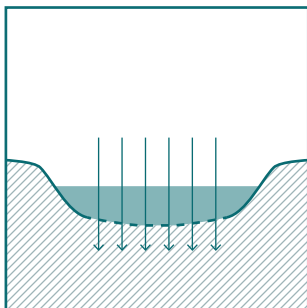


RESTRICT CONSTRUCTION
FOR CLEVER LAND-USE



PLANT MORE TREES
FOR CLEAN AND COOL
LOCAL & GLOBAL CLIMATE

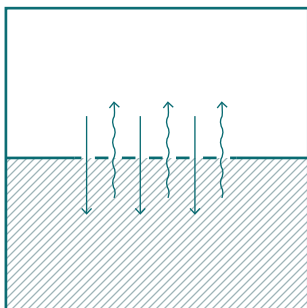
Figure 18. *Toolbox for ecological resilience offers a set of tools of which a part target to improve general ecological resilience on a larger scale and another part target to tackle particularly flood resilience on a smaller scale.*

IMPROVING FLOOD SPECIFIC RESILIENCE

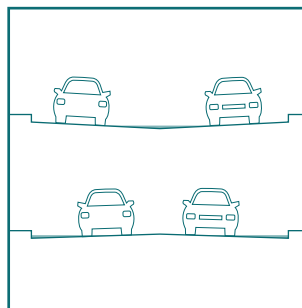
RETENTION PONDS
FOR INFILTRATION AND
TEMPORARY STORAGE



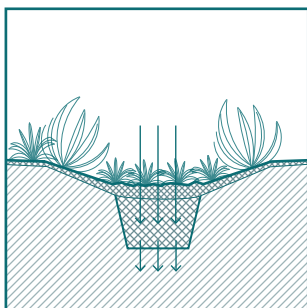
RAINWATER HARVESTING
FOR REUTILISATION



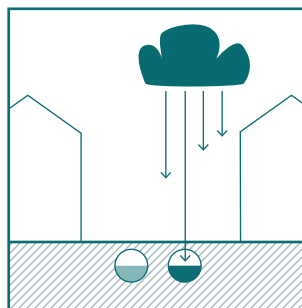
PERMEABLE SURFACES
FOR INFILTRATION AND
HUMIDITY EXCHANGE



STREET PROFILE
ADJUSTMENT FOR
CHANNELING WATER



BIOSWALES
FOR NATURAL STORM
WATER MANAGEMENT



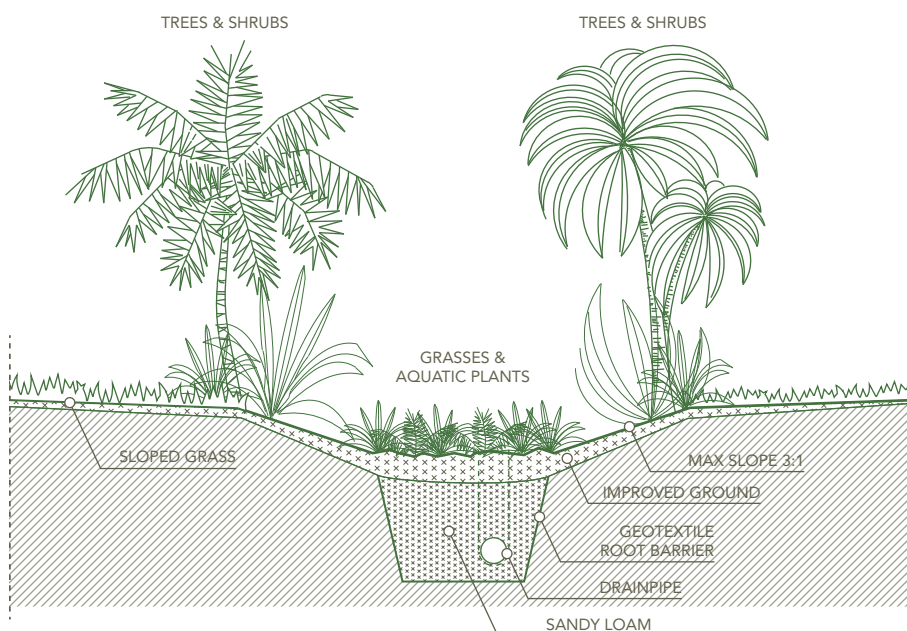
SEPARATE SEWAGE AND
DRAINAGE



TYPICAL STREET SECTIONS IN THE ECOLOGICAL NETWORK



Pedestrian and cycling ways 1:250. Walking and cycling are enabled across the green areas to improve the connectedness between residential areas. With good connections and natural shade from the trees, the green areas also attract inhabitants and visitors to spend time outdoors and reconnect with nature.



Bioswale 1:50. Bioswales can complement a drainage system while enhancing the city's biodiversity and quality of life. They can function as ecological connection zones through the city and help alleviate heat stress and improve air quality. A bioswale is a vegetated ditch with a porous bottom, and it must always be connected to surface water to deal with occasional overflows. Bioswales are most suitable for areas with low groundwater levels and porous soil types. (Urban green-blue grids, 2018; image by the author.) It is not in the scope of this case study to present a comprehensive drainage system complemented with bioswales, but bioswales are presented here as a viable option in resilience building in communities encountering troubles with flooding.

CHUINI DEVELOPMENT GUIDELINES APPLIED IN THE ECOLOGICAL NETWORK



PROXIMITY TO THE OCEAN

Tourism is restricted to the existing resorts to maintain the beach mostly in public use and to prevent further loss of green areas along the seaside, because they have a vital role as coastal protection against storms and erosion.



AGRICULTURAL ACTIVITIES AND NATURE

Buffer zones along streams are determined to allow controlled flooding and help in storm water retention. Additional bioswales are proposed inside the residential areas to connect water flows to both natural waterways and engineered drainage, which requires further planning. Bioswales and water retention areas also ensure the recharge of aquifers. Most of the agricultural land is preserved to support local livelihoods and to preserve the character of the area. New trees are planted inside residential courtyards and along all streets and pathways.



TRAFFIC

Walking and cycling access across the green areas is improved by new pathways that enhance the connectedness of the whole area.



HOUSING

Not addressed.



PUBLIC SERVICES

New parks provide opportunities for many kinds of recreational activities from playing games to strolling and cycling and relaxing in cool natural shade. Open fields enable the organisation of larger community events.



COMMERCIAL ACTIVITIES

Not addressed.




WASTE MANAGEMENT

Existing dumping sites in green areas are cleaned up and trash bins are introduced along pedestrian pathways in the parks.

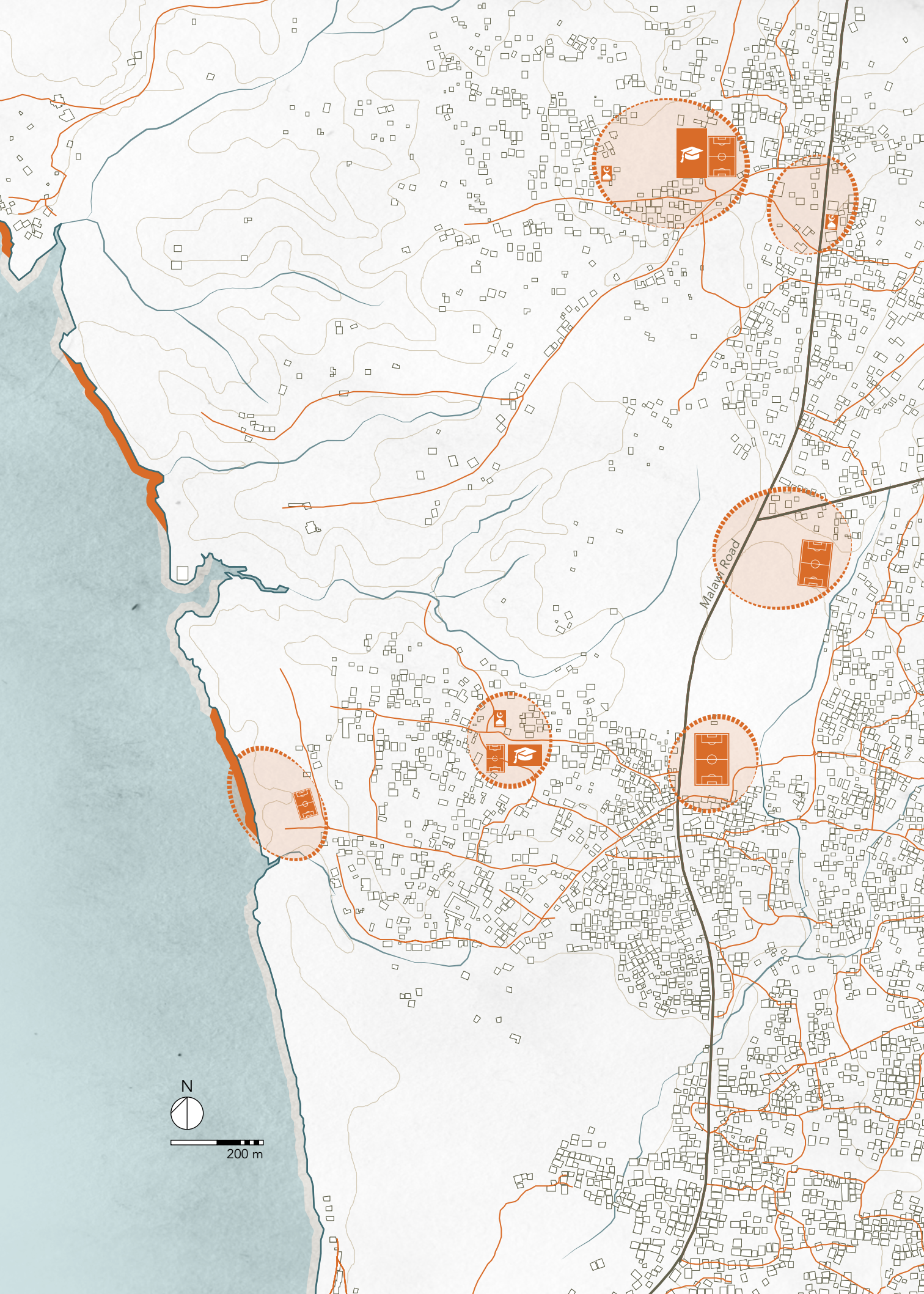


Map 7. Analysis — existing, identified social activities

1:10 000

	Social hub		Main road
	School		Dirt road
	Mosque		Stream
	Beach activities		Contour line, 5 metres
	Football field		Building

There are six major social hubs, which gather activities related to education, religion, and recreation together. These hubs are mostly well connected by footpaths and dirt roads spontaneously created by the inhabitants. However, across and along Malawi road, the connections are lacking and unsafe for pedestrians and cyclists. There is also need for new opportunities for varying social activities and services.





Map 8. Chuini — new social network

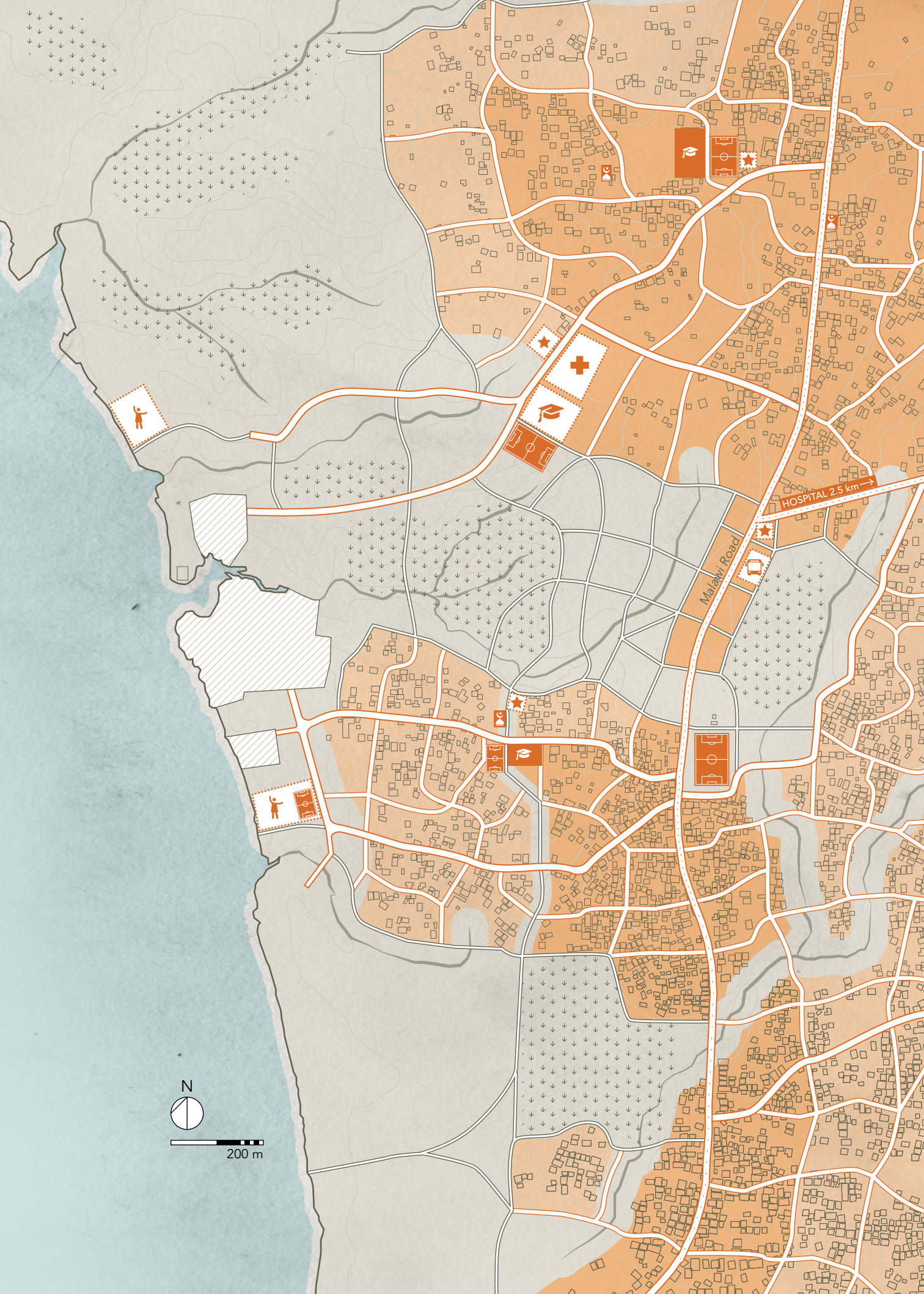
1:10 000

	Housing area, moderate to high density		Upgraded main road
	Housing area, low density		New neighbourhood road
	New bus terminal		New walking & cycling pathway
	New health clinic		Ecological network pathway
	New community centre		Stream
	New recreational zone		Contour line, 5 metres
	New school		Building
	Existing school		Green area
	Existing mosque		Agricultural land
	Football field		Private area – resort

Connecting social components takes the ecological network as a starting point and acknowledges both existing social structures and lacks in services and connections, to improve the connectedness and inclusivity in Chuini. The social network consists of residential areas and social nodes that are connected by walking and cycling pathways.

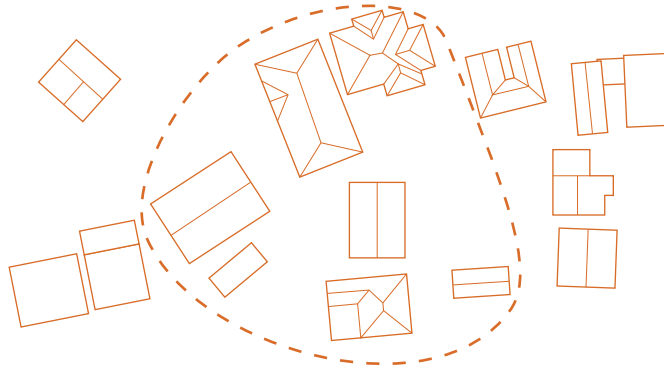
The residential areas are to be developed incrementally from comprising only detached houses into comprising more varied housing typologies. The aim is to avoid restructuring the whole fabric (in other words, demolishing and building from the ground up), but instead respecting the existing fabric and complementing it in a sensitive manner. The incremental densification aims at finding a balance between the existing and the new by forming clusters within the current urban fabric and complementing them with new houses (Figure 19).

The social nodes are active hubs in the social network that enable public life outdoors (e.g. a square) or indoors (e.g. a community centre). The network of walking and cycling pathways ease navigation within the residential areas, and between nodes, and connects them also to the pathways in the ecological network. The social network also includes wider neighbourhood roads that enable limited motorised traffic throughout the area. The main road is upgraded to better enable safe pedestrian and cycling access and there is new bus terminal at the main crossroads.

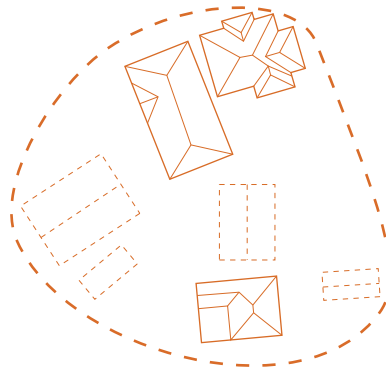




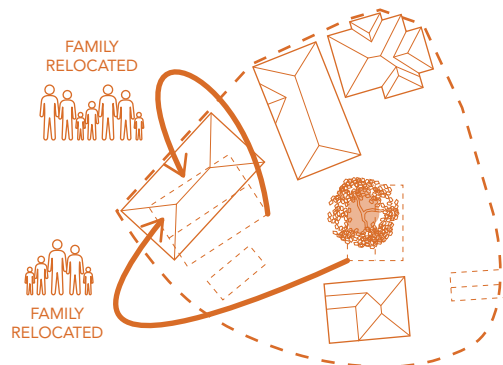
INCREMENTAL DENSIFICATION



1 DEFINING A CLUSTER OF EXISTING BUILDINGS
IN THE CURRENTLY UNSTRUCTURED URBAN FABRIC



2 CHOOSING BUILDINGS TO BE DEMOLISHED
BASED ON FUNCTION AND CONDITION



3 OFFERING EXISTING FAMILIES ON THE SITE
A HOME IN THE NEW BUILDING TO PRESERVE
INTANGIBLE HERITAGE



Figure 19. Incremental densification enables supporting social and cultural resilience while building a denser urban fabric to protect ecologically vulnerable areas from construction. Some existing buildings must be demolished to make way for higher buildings to be able to accommodate the growing population. Whenever a family must give up their house, they are provided a new home inside the cluster they were originally located in. The new bigger buildings offer housing also to people relocated from the protected green areas and new residents moving in Chuini. The new urban fabric gives structure to the currently undefined flow of private and public spaces.



TYPICAL STREET SECTIONS IN THE SOCIAL NETWORK



Pedestrian pathways 1:250. Walking and cycling ways form the backbone of the transit network. Barazas enable stopping for relaxation or socialising under the shade provided by trees that line the pathways. Cycling ways can be harnessed for the use of emergency vehicles upon need. Street lighting eases navigation and improves accessibility and safety.



Neighbourhood road 1:250. Safe pedestrian access and cycling are enabled beside all neighbourhood roads. Motorised traffic is restricted to a speed limit of 30 km per hour for safety. Street lighting further increases safety and new trees bring comfort in the hot climate.

CHUINI DEVELOPMENT GUIDELINES APPLIED IN THE SOCIAL NETWORK



PROXIMITY TO THE OCEAN

New recreational hubs are proposed by the beach to enhance public access there. Only lightweight structures are allowed on the waterfront, but the hubs allow for various activities from outdoor games to organising events.



AGRICULTURAL ACTIVITIES AND NATURE

Housing is relocated from the ecologically vulnerable areas to new housing clusters developed within the existing urban fabric. New housing respects the determined buffer zones.



TRAFFIC

Connectedness within the residential areas and between the social nodes is strengthened with safe walking and cycling pathways that are lined with new street lighting and trees. A limited number of motorised neighbourhood roads improve accessibility and cycling paths can be used by emergency vehicles. A new bus terminal is proposed at the main crossroads on Malawi Road.



HOUSING

Housing areas are incrementally densified within the new building clusters. Primarily buildings that are in bad shape, still under construction, or on ecologically vulnerable land will be demolished. People living in or constructing these buildings will be offered a new home in the new houses built in the clusters. People will be relocated as close to their original residence as possible.



PUBLIC SERVICES

New social nodes are created by introducing public, accessible, and inclusive gathering spaces, both indoors and outdoors. A new health clinic and a school are proposed in one of the new nodes. A new hospital 2.5 kilometres east of Chuini centre supports the provision of health services in the area. Football fields and playgrounds are located in easily accessible green areas inside or close to the housing areas.



COMMERCIAL ACTIVITIES

Not addressed.














WASTE MANAGEMENT AND SANITATION

Trash bins are introduced along pedestrian pathways in all residential areas. Waste collection points are located next to the community centres in the social nodes, where the inhabitants are provided with information on sorting their waste. Public toilets are also located next to the collection points.

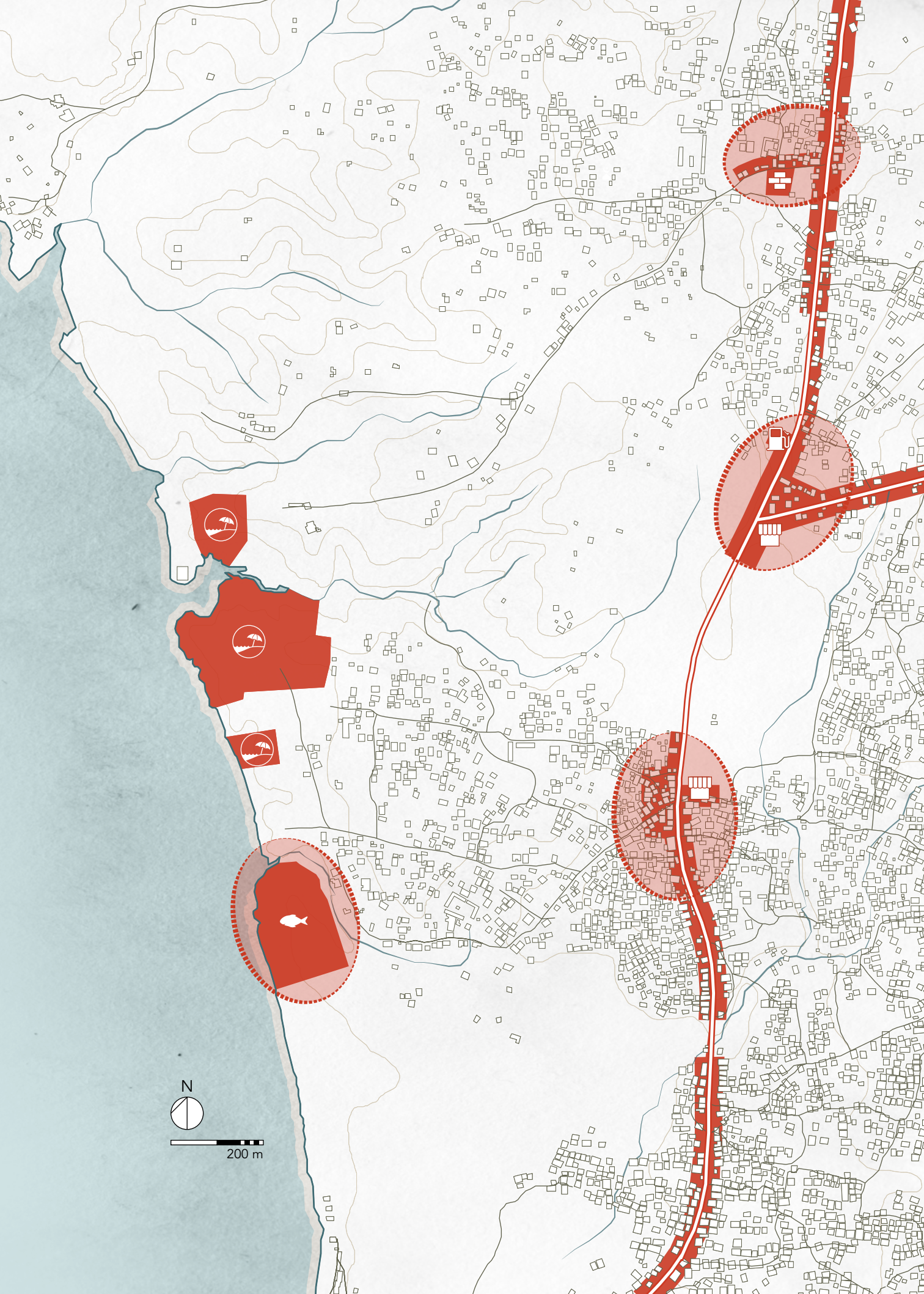


Map 9. Analysis — existing, identified economic hotspots

1:10 000

	Economic hub		Main road
	Market		Dirt road
	Fish industry		Stream
	Brick factory		Contour line, 5 metres
	Petrol station		Building
	Resort		

There are small scale commercial activities along Malawi Road and along some of the major dirt roads close to the main road. There are four major hubs for economic and commercial activities. The hubs are well connected, but lack both internal structure and infrastructure for the specific activities.





Map 10. Chuini — new economic network

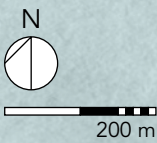
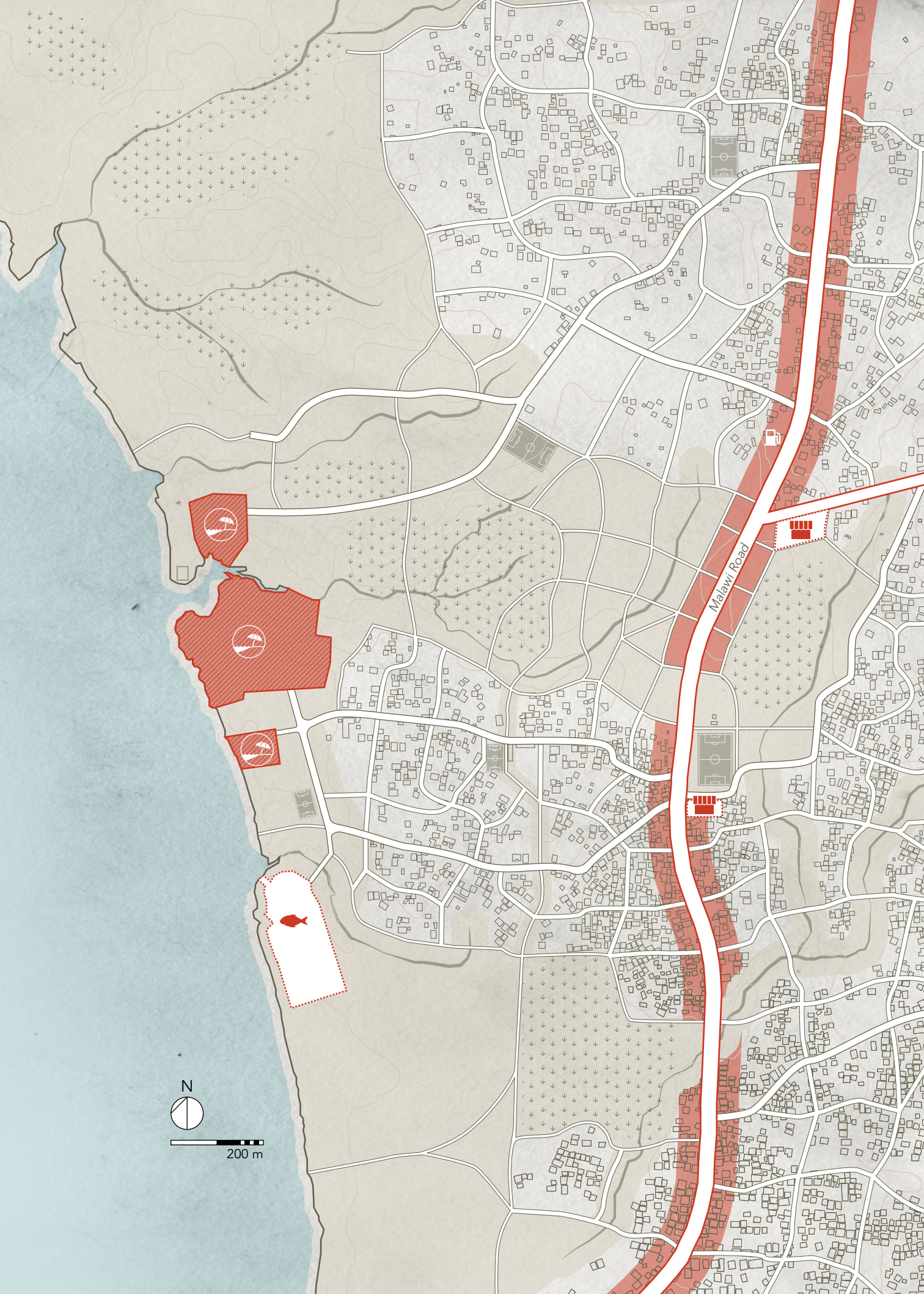
1:10 000



Complementing with economic components begins by identifying the ecological and social preconditions after which the goal is to support the preservation and creation of livelihoods and economic activity in Chuini. The economic network builds around the upgraded main road which is developed into a green boulevard. The boulevard is the primary connection between the centre of Zanzibar Town and the northern part of Unguja, which is why it prioritises public transport in motorised traffic. It also enables safe pedestrian and cycling access through the area and thus completes the social and ecological networks of pathways.

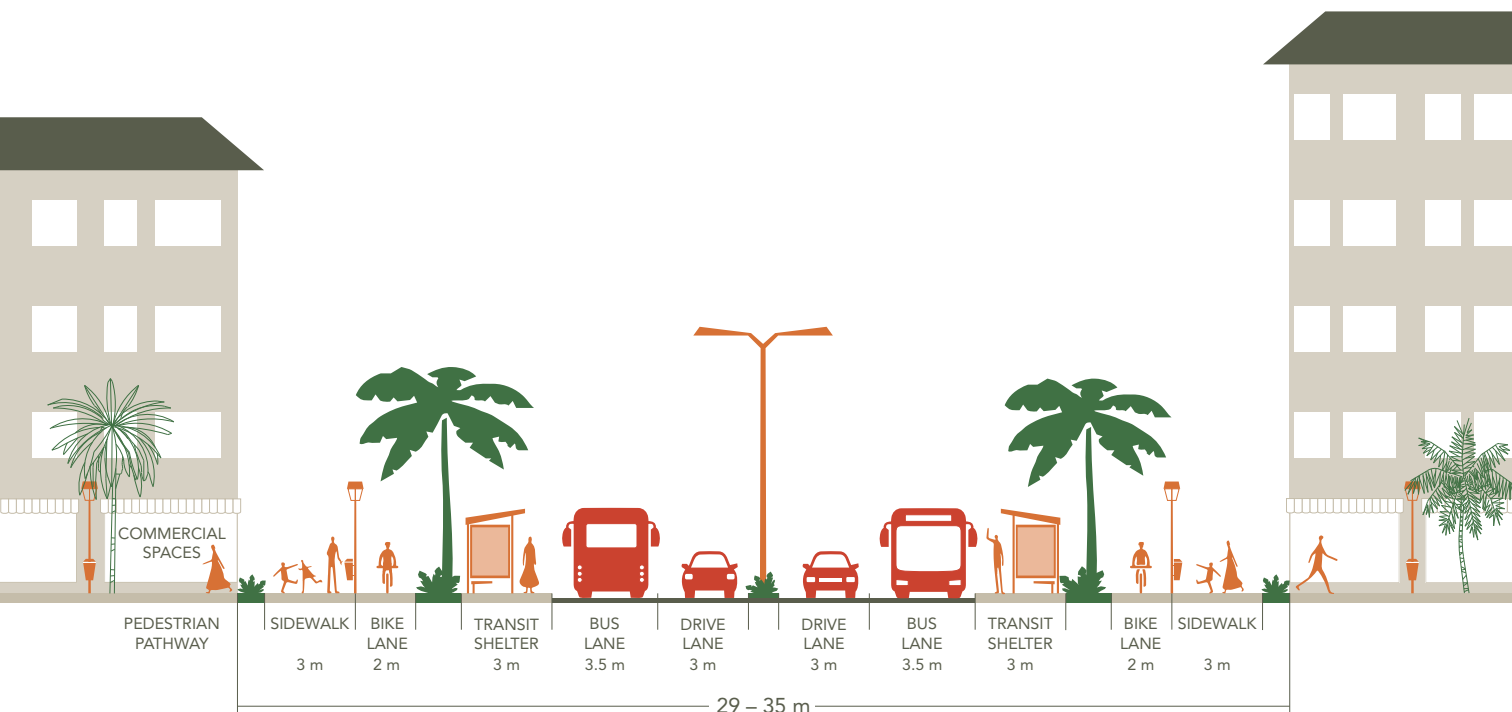
The crossroads is developed into the main economic node of the network. In this node, there are the new bus terminal, a new, large community centre, a new indoor and outdoor marketplace, and a large activity square that connects the node to the ecological network. The boulevard is lined with mixed-use buildings that provide commercial spaces, office spaces, and affordable housing. These mixed-use buildings enable a financing model for constructing affordable housing (Figure 20).

Another smaller marketplace is located a little south from the main node. This market focuses on fish products produced in the upgraded fish factory by the beach. The fish factory is designed so that it does not cause any environmental hazards. Smaller commercial spaces are scattered around the community providing local services for the inhabitants along the neighbourhood roads.





TYPICAL STREET SECTION IN THE ECONOMIC NETWORK



Boulevard on Malawi road 1:250. Priority is given for public transport, walking, and cycling. Sidewalks and bike lanes are separated from motorised traffic for safety but enable easy access to both transit shelters and commercial spaces lining the boulevard. Motorised traffic is restricted to a speed limit of 50 km per hour. Tree lanes along the street are to be designed as part of the storm water management system to improve the water retention capacity.

FINANCING AFFORDABLE HOUSING

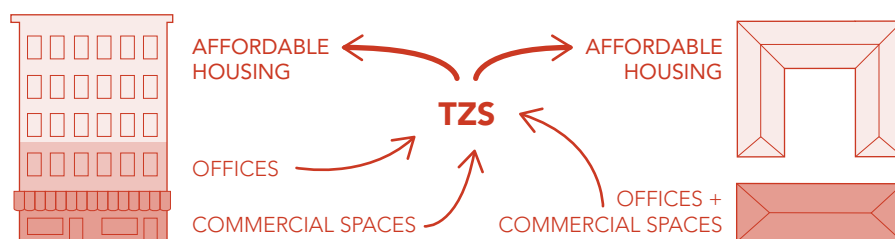


Figure 20. Financing affordable housing. Mixed-use buildings offer a financing model for constructing affordable housing through the money (TZS, Tanzanian Shilling) acquired through renting spaces for commercial activities or office use. The model could work in the scale of a single building or that of a city block. As housing finance is not the focus of this thesis, this is a very rudimentary model but worth further research.

CHUINI DEVELOPMENT GUIDELINES APPLIED IN THE ECONOMIC NETWORK



PROXIMITY TO THE OCEAN

The existing fish drying activities are proposed to be located slightly more inland to respect the coastal buffer zone. New infrastructure is proposed to improve working conditions, hygiene, and waste management to protect the environment. The facility is well connected to the upgraded fish market by the main boulevard.



AGRICULTURAL ACTIVITIES AND NATURE

Not addressed.



TRAFFIC

Malawi Road is developed into a green boulevard that provides safe access through Chuini prioritising walking and cycling and public transport. Private motorised traffic is enabled but people are encouraged to choose other means of transport by making them affordable and accessible for all.



HOUSING

Constructing mixed-use buildings along the boulevard allows for a financing model in which the commercial and office spaces partly fund the construction of affordable housing.



PUBLIC SERVICES

Not addressed.



COMMERCIAL ACTIVITIES

The main economic node is located at the main crossroads on Malawi road. To support and synergise with the social activities in this node, there is a new indoor and outdoor marketplace. All buildings along the boulevard host commercial spaces on the ground floor. Small shops are also introduced inside the residential areas to provide local services for the inhabitants. The existing fish market a little south of the main node is upgraded to better serve the fishers and the customers.











WASTE MANAGEMENT

The main waste collection point is located next to the bus terminal and the community centre. Waste collected here is further transported to be recycled as raw material for new products encouraging new circular economic activity. Biodegradable waste is processed to be used in agricultural activities in the area.

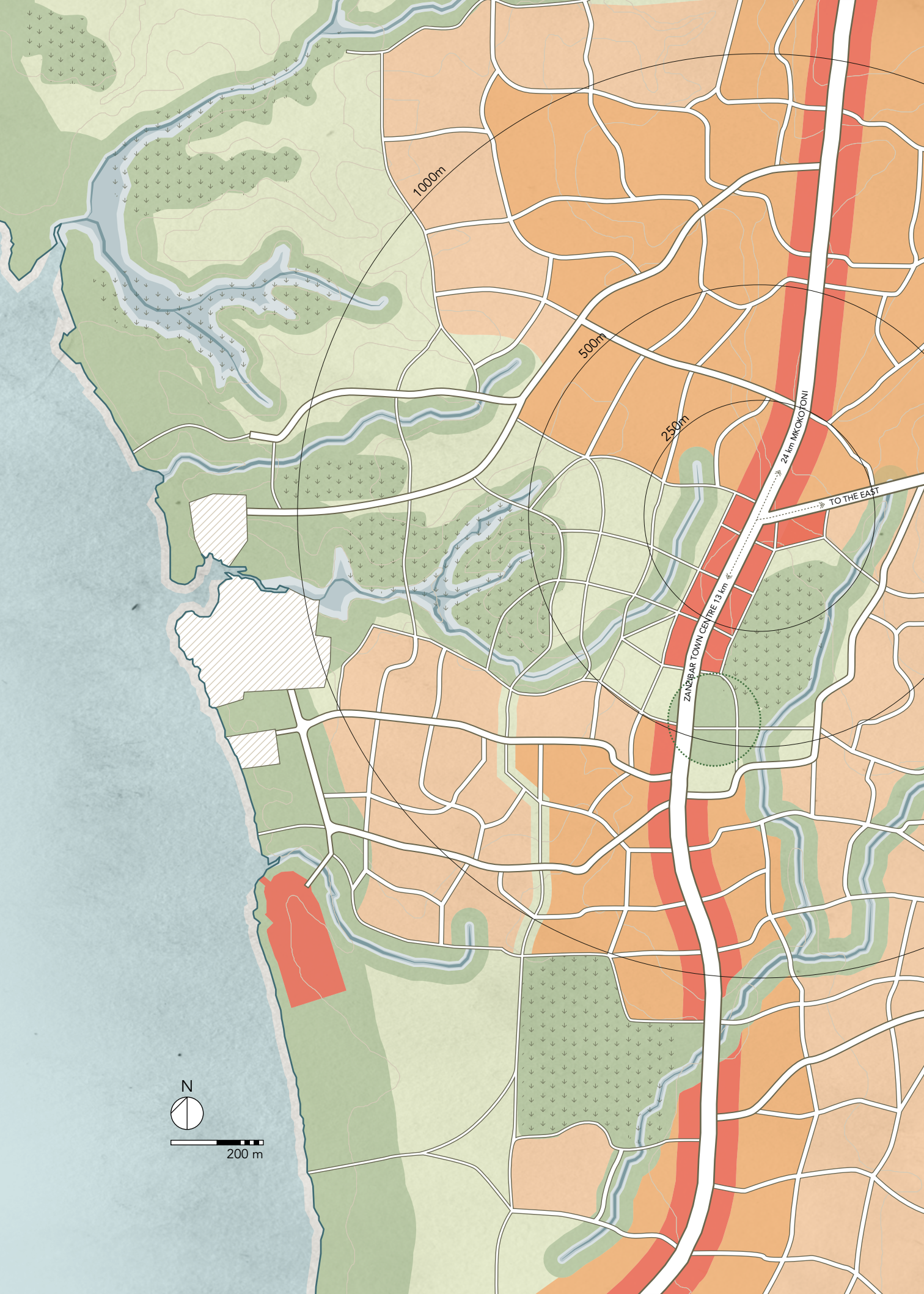


Map 11. Chuini – conceptual proposal for a resilient urban centre

1:10 000

	Green area		Boulevard
	Green buffer zone		Neighbourhood road
	Agricultural land		Walking & cycling pathway
	Housing – low density		Contour line, 5 metres
	Housing – moderate density		Water source buffer zone
	Housing – high density & Commercial zone		Major stream
	Beach		Estimated flooding area
	Private area – resort		

The proposal for the development of Chuini comprises three overlapping networks that prioritise the ecological sustainability of Chuini's social-ecological system, connect the existing and new social components of the system, and complement the system with improved economic components. Executing urban design and planning with this hierarchy helps developing a more resilient social-ecological system.





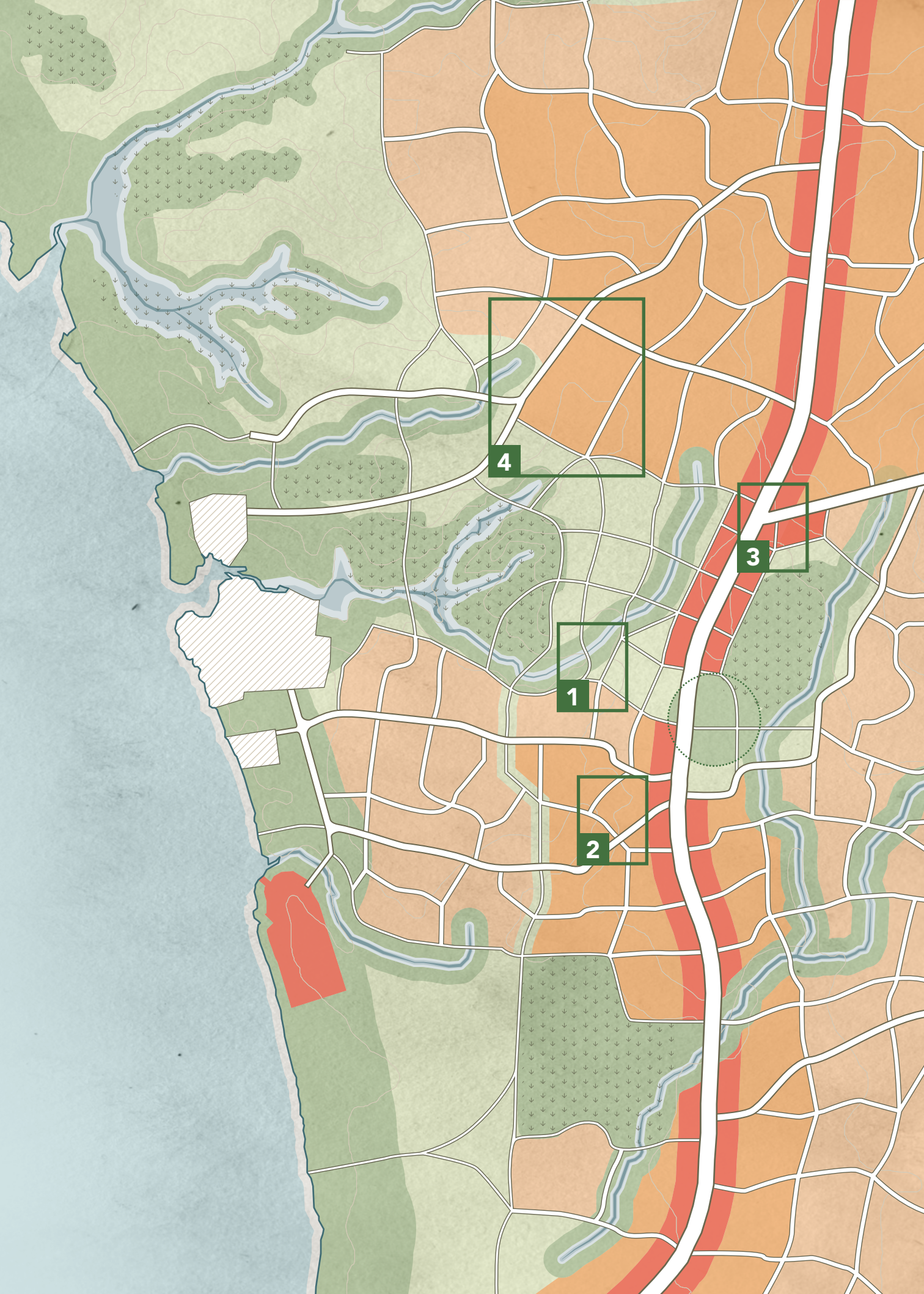
Designing functional and resilient nodes is the next step after creating the overlapping networks. Each node within the combined network is an intertwined web of solutions in ecological, social, and economic realms. Four exemplary nodes are presented on the following pages, each of them illustrating a concept for developing a specific type of an area typical in Chuini to be more ecologically, socially, and economically resilient.

The locations of the studied areas are presented on the map on the right. These areas were chosen as representative of the different typologies found in Chuini: green areas, residential areas, commercial zones, and open, undeveloped areas, which are well suited for developing new community hubs with residential zones and public services.

CONCEPTS FOR DEVELOPING RESILIENT NODES IN CHUINI



- NODE 1** GREEN AREA pages 128–129
- NODE 2** RESIDENTIAL AREA pages 130–131
- NODE 3** COMMERCIAL AREA pages 132–133
- NODE 4** OPEN AREA pages 134–135





NODE 1 / Concept for developing green areas

BEFORE. *The green areas are partly in their natural state and partly cultivated. There are many houses under construction in vicinity to the croplands and the streams. Houses are scattered in the landscape and connected with dirt roads and footpaths. (Drone image by Zanzibar Mapping Initiative.)*



AFTER 1:1000. The exemplar green area is developed into an ecological node with pedestrian and cycling ways which are lined with trees and barazas. There are playgrounds and activity squares to support outdoor public life. Part of the cultivated land is preserved and the rest of the green space is developed into a public park. The squares are paved with permeable materials. The buffer zone along the stream prohibits construction there, so inhabitants are relocated into new clusters on the edges of the park. There is a water retention pond to improve the storm water management in the park, which also receives runoff water from the surrounding residential areas.



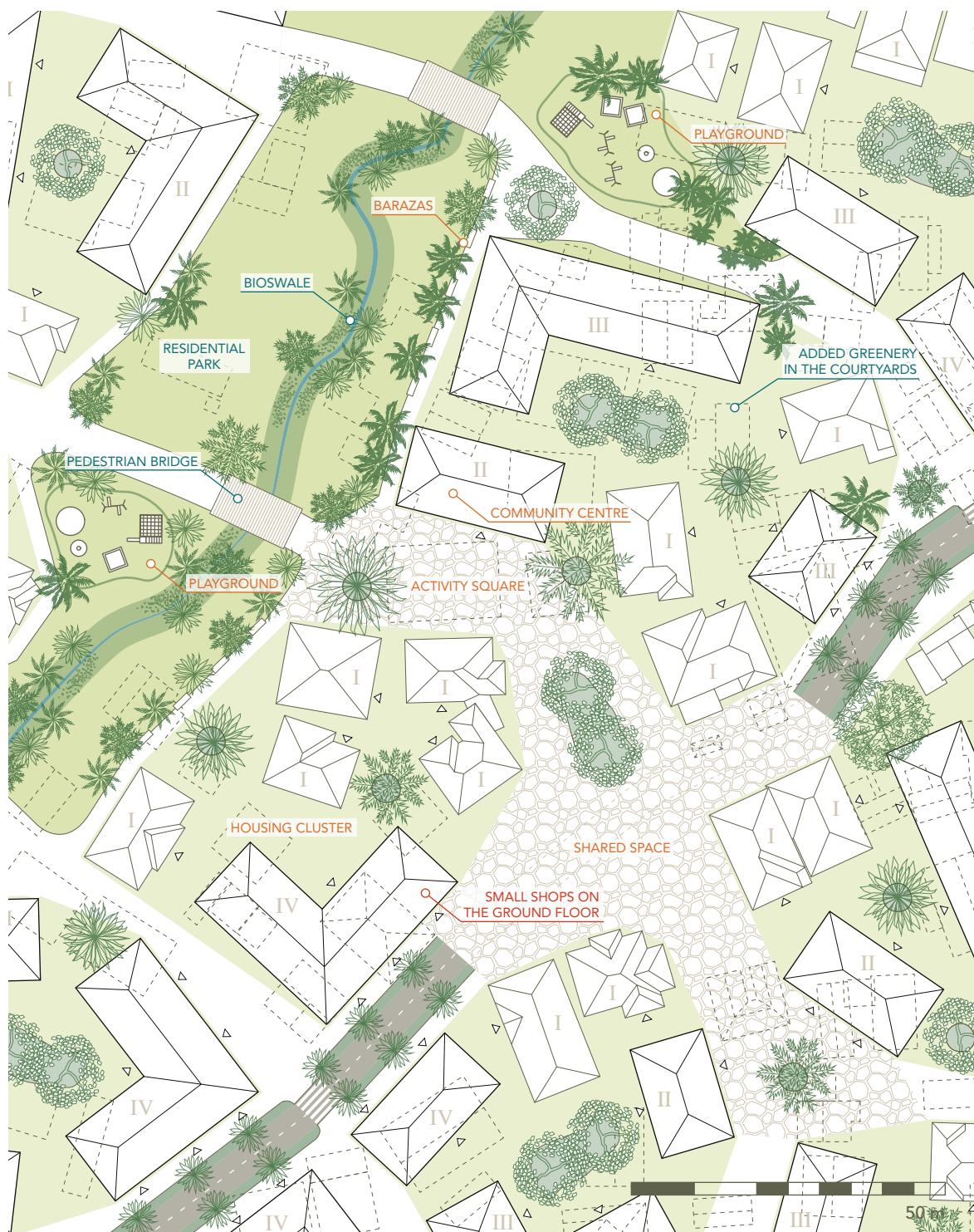


NODE 2 / Concept for developing residential areas

BEFORE. Residential areas are partly built in a very dense manner, but partly housing is randomly scattered in the landscape. Most of the buildings are detached houses and there are many buildings under construction. There are often small green spaces and trees between houses but no squares to support public city life. (Drone image by Zanzibar Mapping Initiative.)



AFTER 1:1000. The exemplar housing area is developed into a social-ecological node that provides opportunities for social life both indoors and outdoors. There is a community centre at the edge of the residential park next to an activity square. A bioswale running through the park improves storm water management. Housing is organised in clusters which have their own, private inner yards which connect to the surrounding public spaces. New houses imitate the existing building stock in style, but are built in multiple stories and painted with natural colours to give identity to each neighbourhood. Pedestrian and cycling ways make it easy to navigate through the area. A new motorised drive lane runs across the shared space in the middle, where the speed limit is 10 km/h.





NODE 3 / Concept for developing commercial areas

BEFORE. *The main road is bordered with cultivated land from two sides and lined with small commercial stalls. Dala dalas to and from the Town centre stop on demand along the road, but the busiest stop is located next to the big crossing. (Drone image by Zanzibar Mapping Initiative.)*



AFTER 1:1000. The existing small commercial cluster is developed into a bustling economic node. The boulevard is lined with mixed-use buildings, which host commercial activities on the ground floor, and offices and housing on the higher floors; some buildings could be entirely in commercial use. The new bus terminal is located in the heart of the hub, providing good public transport access to and from the area. Parking for private cars is along the main street, but public transport is favoured in all transport solutions. There is a new marketplace providing both indoor and outdoor spaces for commercial activities. The activity square and community centre bring indoor and outdoor public life to the hub and connect it with the green areas.



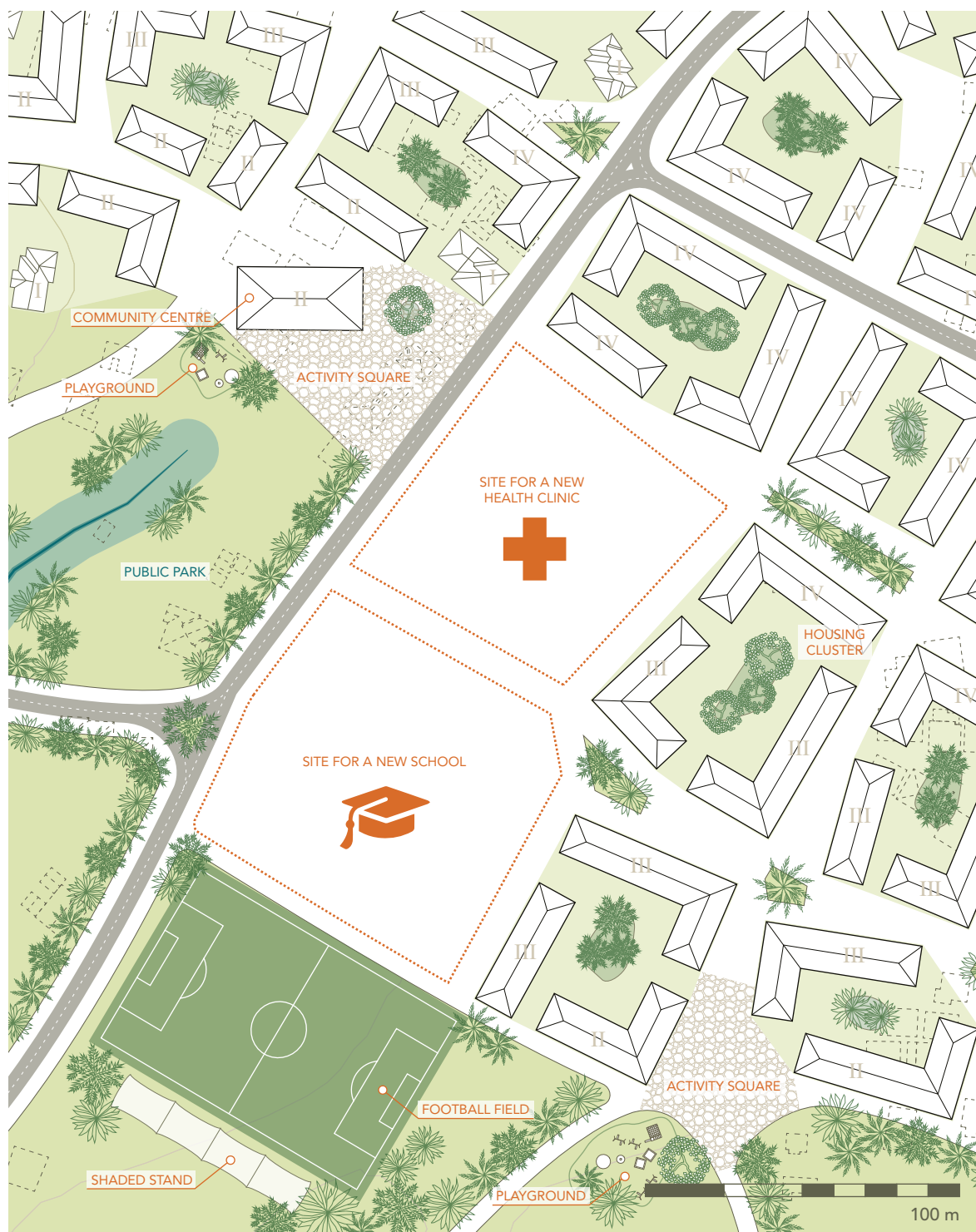


NODE 4 / Concept for developing open areas

BEFORE. *There are large open areas in Chuini where there is neither agricultural land nor dense forests. In these areas there are numerous houses under construction scattered around along the small dirt roads and pathways. (Drone image by Zanzibar Mapping Initiative.)*



AFTER 1:2000. Open areas that are not cultivated nor covered by forest are developed into community hubs which build around a community centre next to a park. In this exemplar community hub, there is also a site for a new school and a new health clinic. There is a new football field to serve the new inhabitants of the area. Housing is arranged in clusters, which leave varying public square in between them. The area is not yet densely built so not too many houses have to be demolished. People whose foundations have to be deconstructed to give space for densification, will be offered a new home in the new houses.



6.3 Conclusion

This chapter has presented a framework for developing resilient cities and illustrated its application through the example of Chuini, where the informal settlement develops into a resilient urban centre. The design proposal was made following the planning hierarchy of the framework and applying the principles for resilient urban design. As a summary, the realisation of each principle is presented here.

Maintain biological and social diversity and promote redundancy. The ecological network aims at protecting biodiversity by determining large green areas to be preserved and by creating green connections between these areas. The social and economic networks support diversity by offering various activities and livelihoods so that people in the area will be better equipped to respond to socio-economic changes. Redundancy is addressed by not relying solely on one solution, but building versatile networks, where multiple solutions improve for instance storm water management.

Ensure ecosystem service provision by embracing multifunctionality. The indoor and outdoor spaces that are proposed to be developed in Chuini are all multifunctional. For example, the public park is a recreational area but also participates in mitigating flooding through retention ponds, and the bioswales are part of the residential parks but also enhance storm water management. Future ecosystem service provision is ensured through protecting vital green and blue areas.

Engage the community and encourage learning. The basis of the design proposal lies in the community engagement presented in Chapter 5. The main goal of the proposal was to respond to the stakeholder needs and concerns, and each network of the proposal addressed various needs. Further engagement and learning should be encouraged if this proposal is implemented. Inhabitants should be educated about the function of the bioswales and other storm water management solutions, about the importance of respecting the defined buffer zones, and the benefits of proper waste recycling. This learning has potential of turning into new innovations.

Support functionality of networks by managing connectivity. Improving connectedness was among the key goals to improve liveability in Chuini and making the community more resilient. All the nodes within each network are connected with new walking and cycling pathways and new neighbourhood roads, and all of these connect to the boulevard, which improves the connectedness of the new urban centre to other parts of the island. Bioswales are connected to a new drainage network — which is needed in the area, but whose planning was not in the scope of this thesis — and streams in the parks, which run to the ocean.

Managing slow variables and feedbacks & applying adaptive planning. Principles 5 and 6 are out of the time frame of this thesis, because implementation and follow-up are not included here. Nevertheless, these principles should definitely be considered in sustainable and resilient urban design whenever there are not such constraints. They should also be implemented in the case of Chuini if the design proposal is taken further.



Image 14. *All the networks in Chuini are based on a flow of connections and all the nodes within the networks are connected to each other — like these passion fruit vines found in Zanzibar.*

The design proposal is not a definitive urban plan but lays out strategies to follow in order to manage urbanisation in Chuini in a sustainable way. The framework is equally valuable in other parts of Zanzibar, and also elsewhere across the world, whereas the chosen design solutions illustrated in Chuini can be adapted in similar contexts only with careful consideration. Prioritising ecological sustainability is key in urban design and planning to be able to respond to the environmental challenges in Zanzibar. Connecting the social components and incrementally densifying the urban fabric are required to respond to the rapid population growth and to halt the urban sprawl from destroying invaluable natural environments. Completing the system with economic components is crucial to support local livelihoods and spur new economic activity.



DISCUSSION & CONCLUSION

"It's not the solution itself that is necessarily radical but the shift in perspective with which we begin, from the old view of nature as something to be controlled to a stance of engagement."

– Michael Braungart & William McDonough (2008, p. 84)

Palm trees in a wooded part of Chuini, Zanzibar Town.

Prioritising ecological resilience and sustainability in urban design

This thesis has underlined the urgency of tackling the environmental crisis inflicted by population growth, urbanisation, and human activities that have neglected the natural environment. As a response to this, this thesis has endorsed the new definition for sustainable development, in which ecological sustainability is prioritised, and social and economic sustainability are pursued subordinate to it. Resilience has been presented as key to achieving the goal of global sustainability, and urban design and planning have been proposed as essential tools to improve resilience in cities. Based on these theories, this thesis has aimed to find sustainable solutions to rapid urbanisation, exemplified in the context of Zanzibar, and to determine how urban design can improve resilience to environmental and socio-economic changes in the development of informal settlements there.

In this thesis, I have considered ecological sustainability the primary objective, because without the integrity of the natural environment, there are no conditions for development or true prosperity in the social or economic realms. If humankind tips the Earth system to a point of no return, any social plight, cultural loss, or economic deprivation loses their meaning. If human actions result in this planet becoming uninhabitable, it will be just that — uninhabitable, unable to support social or economic activities or even human well-being. I argue that dividing the remaining operating space within the planet's capacity in a just way means dividing it based on the share each country has had in causing the environmental crisis at hand. That is how equal development opportunities can be ensured to all human beings while respecting the unique and limited living environment on our planet.

Urban design and planning can foster sustainability in urban areas by applying resilience thinking in the design and planning processes. Through the example of the case study, I have illustrated how urban design can be utilised in building ecological, social, and economic resilience in cities. The main outcome of this thesis, the development framework for urban resilience, enables responding to rapid urbanisation in a sustainable way. This was exemplified by applying the framework in Chuini, where three overlapping networks were created to prioritise the ecological sustainability of the studied system, connect the social components of the system, and complement the system with economic components. The toolbox for ecological resilience, the guidelines for incremental densification, and the concepts for developing varying types of areas into

*"A thing is right when it tends to preserve
the integrity, stability and beauty of the biotic
community. It is wrong when it tends otherwise."*

— Aldo Leopold (in Kobylecky, 2015)

resilient nodes offer examples of how the resilience of an informal settlement can be improved by urban design.

This thesis has presented broadening participation as an essential method to improve resilience in social-ecological systems, and it was one of the key principles I followed in carrying out my research in Zanzibar. Regardless of the brief period I spent there, I got an opportunity to get personal input from the inhabitants by utilising design probing, workshopping with school children, and interviewing key stakeholders. The responses collected through the chosen engagement methods enabled taking into consideration the participants' concerns, but also being able to emphasise qualities they find important in their surroundings. The design probing responses, for instance, conveyed the impression that the community appreciates their green surroundings and has a concern for nature. This same concern could be interpreted to have been expressed by the children in their drawings, where dumping sites and trash were marked as something they did not enjoy in their environment.

Addressing the concerns and wishes expressed in the community engagement can translate into improved resilience. The designer is better equipped to plan more diverse and redundant environments of varying landscapes, spaces, and livelihoods, whereas the inhabitants might be encouraged to tackle some of the issues raised in the design probes or the workshop tasks themselves. This may enhance the feeling of ownership in the community and encourage its members to take further actions to develop their community to be more resilient, which further fosters sustainability.

The way forward

Considering the detrimental environmental impact of the field trip that was necessary to conduct the research presented in this thesis and the fact that there is currently no funding to actually implement the development framework or my design proposal in Chuini, what is the value of this thesis? The practical value of this thesis lies partly in the extensive site analysis that the Department of Urban and Rural Planning in Zanzibar can utilise in their future work. I have presented different tools for making field observations and engaging the local community in the design process, which I hope to be applied in future projects in Zanzibar. I also consider the development framework exemplified in the context of Chuini to be useful in the planning of other parts of Zanzibar Town, where urban sprawl is encroaching into valuable agricultural land, green areas, and water catchment and retention areas. The principles about incremental densification in housing clusters can be used throughout the city and the model of financing affordable housing by locating apartments in mixed-use buildings is viable elsewhere, too. The toolbox for ecological resilience is useful when planning Zanzibar Town — or cities elsewhere in the world — to better adapt to adverse impacts of climate change.

The planning hierarchy presented in the development framework for urban resilience gives unquestionable priority to the ecological components of the system under plan-



Image 15. Ready to move to the driver's seat? Women in a pickup on Malawi Road in Chuini, Zanzibar Town.

"We have not yet tipped the planet away from its Holocene equilibrium. Whether we are able to navigate the world back into a safe operating space, thereby creating a chance for a world of nine to eleven billion co-citizens to live and thrive, is up to us. In the Anthropocene, we are in the driver's seat."

– Johan Rockström (2015)

ning. However, the hierarchical steps being nested instead of listed implies interdependencies between the steps. While the ecological components are prioritised, the social realm should not be neglected when doing so. Prioritising ecological sustainability should not result in environmental justice violations or inequality within a community or between communities. But the hierarchy is still intact: economic activities cannot override social needs, and social needs must be fulfilled on nature's terms.

I hope that all the principles for resilient urban design will be adopted in urban planning across Zanzibar. Although it was not possible in the timeframe of this thesis, it would be highly beneficial to also include monitoring slow variables and feedbacks and applying adaptive planning in the process of resilient urban design. If my proposal was implemented in Chuini, it would be best to realise it in phases so that the proposed solutions could be monitored and evaluated after implementation to improve them further. It is crucial to engage the inhabitants in the incremental densification efforts to best respect and protect both intangible and cultural heritage and the inhabitants' quality of life.

Taking further the research carried out in this thesis might include studying a case study area with an engineer to model the water flows and catchment areas. This kind of study might result in a plan of a detailed system for natural water management taking advantage of solutions like bioswales and water retention ponds and utilising different surfaces to improve water collection or infiltration. Monitoring the slow variables and feedbacks after the implementation of the development proposal might also bring about new topics for further research.

Finally, I want to think that research and information as such have value in this day and age. I argue that the theory about sustainability and resilience that I have presented and the urgency of the environmental crisis the humanity is facing must be internalised by all stakeholders. This includes all levels from policy making to designing and planning and the grass roots level of common people inhabiting this planet. This internalisation must also happen across the world in developing and more developed countries alike. Only that way will we be able to make the systemic change required to protect the unique world our survival depends upon.



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IMAGE SOURCES

All images, figures, and maps © Miia Suomela unless otherwise stated.

Book cover image, cover image in Chapter 6 and drone images on pages 99, 128, 130, 132, and 134 © Zanzibar Mapping Initiative and Revolutionary Government of Zanzibar – Commission for Lands. Obtained while in Zanzibar directly from the project directory. Open source material available at: <http://www.zanzibarmapping.com/>

APPENDICES

appendix I

ZanPlan — Zanzibar Master Plan

appendix II

Field diary

appendix III

Design probes

appendix IV

School workshop

appendix V

Interviews

ZanPlan is the main planning document guiding urban planning in Zanzibar. It proposes three new urban centres and six sub-centres to ease pressure from Zanzibar Town centre as the population grows and more people move to town.

Cited from ZanPlan (2015, p. 211)

Chuini is designated for rapid development. It[s] future balanced development requires:

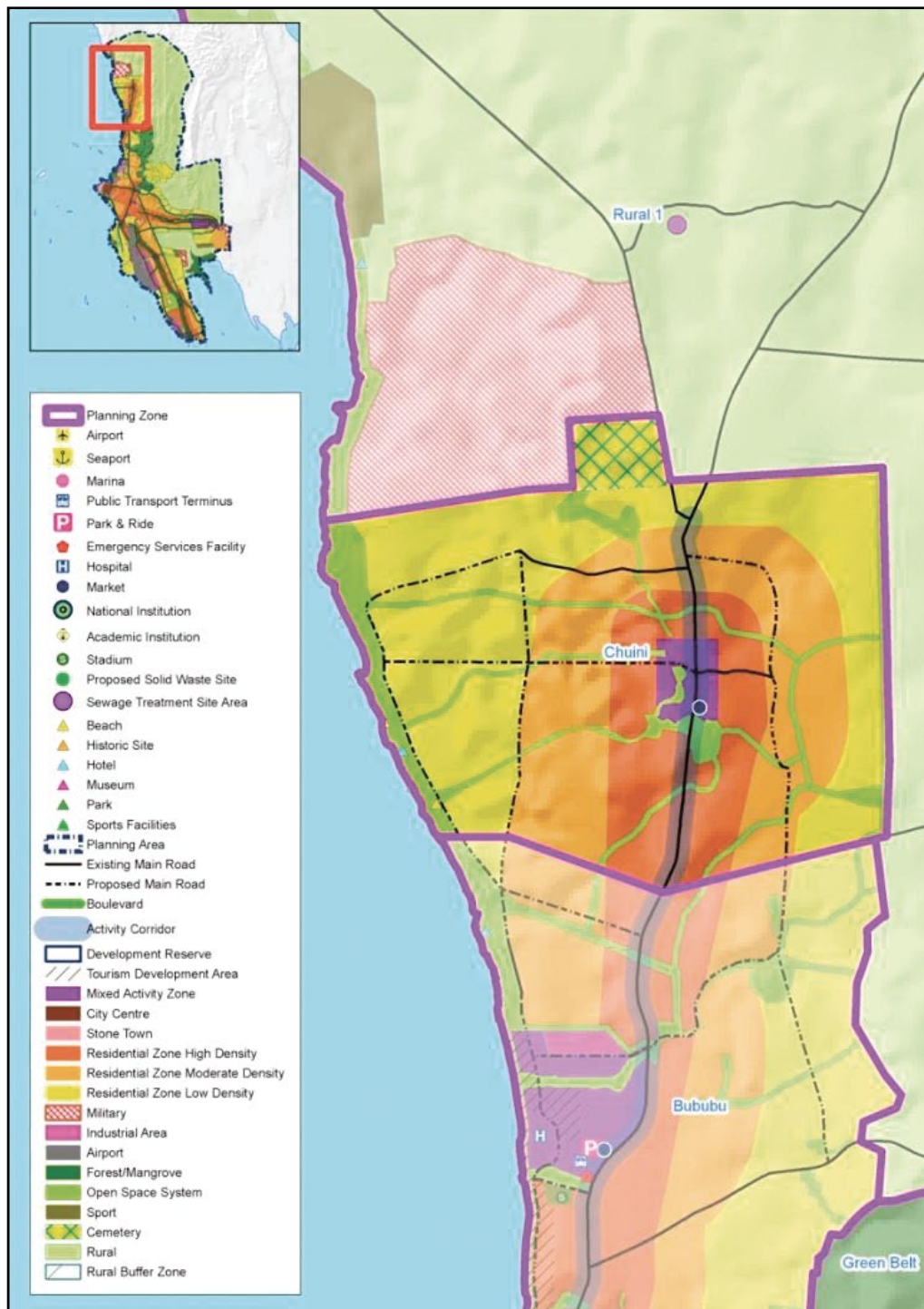
- » Systematic detailed planning for rapid development including infrastructure and services.
- » Immediate clear demarcation to development area boundaries (survey, pegging, planting of trees as boundary demarcation and advising Sheha and residents).
- » Development and upgrading driven by planning and development of sub-Centre.
- » Priority sub-division and demarcation of public elements (roads, open space, public services) and thereafter systematic parcelisation of private plots
- » Systematic development of Malawi Rd. corridor including road widening and upgrade and redevelopment along the corridor.

Characteristics include:

- » Total area size: 917 Ha.
- » Current Population: ~ 10,000.
- » 2035 Target Population: ~ 91,000

LANDUSE	AREA 2013 (ha)	AREA 2035 (ha)
Green Frame & Sport	5	124
Cemetery	–	31
Mixed	3	38
Residential High Density		140
Residential Moderate Density	285	247
Residential Low Density		336
Open Space	5	–
Rural & Agricultural	621	–
Total (ha)	917	917

Intended changes in land-use in Chuini include giving up all open space and agricultural land for construction of residential areas. Source: Table 54 - Chuini Land Use in ZanPlan (2015, p. 212).



Master plan for Chuini proposes a sub-centre with a mixed-activity zone and residential areas with varying densities. Existing large green areas are replaced with a thin network of green veins. Source: Map 90 - Chuini Planning Zone in ZanPlan (2015, p. 212).



ARRIVING TO ZANZIBAR

Sunday 27 January 2019

"I'm surprised about how homely it feels to be back here. Smells on the street were nice, especially peeled oranges."



Second day

Site visits to Chumbuni, Chuini, Mwana-Kwerekwe, Jang'ombe and Kilimani. A lecture at DoURP by Dr. Juma in the evening.



Fourth day

Collecting maps and information at DoURP and planning a workshop to be arranged at a school in Chuini.



Sixth day

Visiting Chumbe island for relaxing and snorkeling. Amazing views from the top of an old light house from 1904.



Eighth day

Walking around the shehia of Kihininani in Chuini gathering first impressions. Interview with the director of the Municipality and discussing with Dr. Juma afterwards.



Tenth day

Workshop at the school in Chuini and walking around the shehia of Chuini taking photos.

First day

Walking in Ng'ambo and seeing the city from above from the top of the Revolution Memorial Tower.



Third day

Meeting with Dr. Juma to discuss my thesis in the morning. Visiting Vikokotoni Environment Society to see the results of last year's tree planting project.



Fifth day

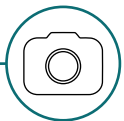
Planning site visits for the following week and visiting Fumba Town.



"We saw two dolphins on the way to Chumbe Island!"

Seventh day

Photographing in Stone Town and Ng'ambo for a reference library of trees, scale people, ventilation openings and facade finishings.



Ninth day

Interview with the director of Zanzibar Housing Corporation. Meeting with the director of DoE got cancelled.



"Jina langu naitwa Miia na ninatokea Finland."

"It's so much to take in with the present conditions and culture that it's easy to forget that all that is built upon a vast range of stories and memories."



Twelfth day

Interview with the director of ZAWA. Meeting with the director of DoE got cancelled again. Presenting initial ideas to Dr. Juma in the evening.



Fourteenth day

Delivering the design probes in Kihinani and documenting the two areas around the commercial spots.



Sixteenth day

Visiting an under construction hospital site in Chuini. Interview with the director general of ZEMA and the director of DoE.



Eighteenth day

Got back 2 probe packages and went to pick up 8 more in the evening. Observing and documenting evening activities in Chuini.

"I'm very grateful for all the help I've had even if everything hasn't gone as planned or as effectively as one could've wished for."

Eleventh day

Interviews with the director of Angoza and with an association called Reclaiming Women's Space.



Thirteenth day

Visiting Paje for relaxing. Rained throughout the day, but change of scenery and swimming made it worth the trip.



"If the aim of this was to learn, I certainly learned a lot."

Fifteenth day

Guided tour in Stone Town. Mapping and photographing in the northern part of Chuini.



Seventeenth day

Interview with Dr. Juma. Rewriting interview notes. Consultation with Dr. Juma in the evening.



"Today my mood has gone from zero to one hundred."

Nineteenth day

Preparing and presenting a preliminary analysis of Chuini at DoURP.



LEAVING ZANZIBAR

Saturday 16 February 2019



Contents of each design probe package

One blue pen

Introduction card

This package of cards has been brought to you so that I could get to know a little bit about you and your life. My name is Miia and I come from Finland where we currently have freezing temperatures and a lot of snow.

The details and stories you will share through these cards will help me with my Master's Thesis that I am writing in a Finnish university. My thesis discusses urbanisation on Zanzibar, specifically in Chuini.

Your help is dearly appreciated. Thank you for your time.

Instruction card

There are three packs of cards, each of them including five cards. On the front of each card there is a picture and on the back there is a question and some blank space. In this blank space I would like you to write (in English or Kiswahili) or draw your answer. The answer may be as short or long as you like.

Package I – Colours

Cards with the colours green, blue, red, yellow, and white

Question: When you think of your neighbourhood what comes to your mind first when you think of the colour green / blue / red / yellow / white?

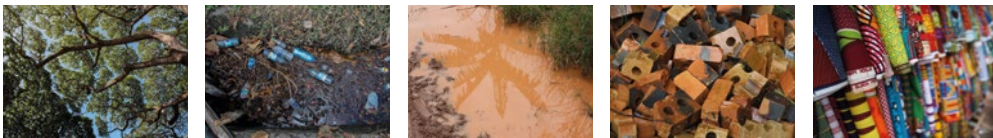
Package II – Words

Cards with the words city, house, home, people, and water

Question: When you think of Chuini what comes to your mind first when you think of the word home?

Package III – Photos

Cards with photos of a tree crown, water bottles in a drain, a palm tree reflected in a muddy pond, building bricks, and colourful fabrics



Question: When you think of your everyday life what comes to your mind first when you look at the picture on the other side of this card?

Execution

Probes planned by Miia Suomela and printed in Finland

All contents written both in Kiswahili and in English; Kiswahili translations by Emma Nkonoki

15 packages delivered in the shehia of Kihinani, 10 packages returned

Delivery on Sunday February 10, 2019; translations upon delivery by Ali Haji Khamis

Pick up on Thursday and Friday February 14–15, 2019

A few picks from the responses

"I think of the forests and rice [fields] that have been invaded for construction of houses."

— Retired, 58, on the colour green

"Because we have the ocean here in Chuini, we would like to have at least a factory for different products from the ocean, so we can have employment."

— Painter, 51, on the colour blue

"I wish there was a modern city with good houses, offices, hospital, schools, areas for business that are good."

— Retired, 58, on the word city

"I am thinking of irresponsible building between houses."

— Housewife, 40, on the word house

"This is water that's still, it is dangerous and it causes diseases since it does not move, it is a place where mosquitos and other insects live."

— Teacher, 42, on the photo of a pond

"The ongoing issue of environmental pollution, population has grown but environment is static in nature. People are less motivated with the environmental pollution. By knowing or not knowing, every one need clean and safe environment."

— Anonymous, on the photo of trash

"The way we are able to use waste disposal in making different things."

— Housewife, 40, on the photo of bricks



Image above portrays some probe responses written in Kiswahili. From top down:

"We condemn with all force the lack of peace inside our Chuini."

"Every human being wants a place to live."

"I think that we should take care of our environment."



Image above portrays some probe responses written in Kiswahili. From top down:

"I think of my life when I look at this picture, I wish that there was a factory that would make fabrics for making clothes etc."

"Yellow is a color that shows a good beginning of the day in the morning."

"People are living organisms, for Chuini there are so many people, but poverty is disturbing us, unemployment and so we need to be empowered."

Task 1: Choose the city you like the most from these 12 images.



Dar Es Salaam, Tanzania

3 votes

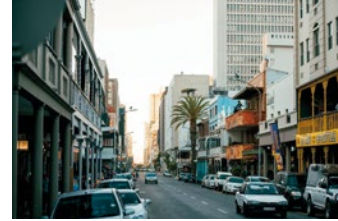
Source: <https://www.herald.co.zw/dar-es-salaam-wins-world-city-mobility-award>



Jurmo, Finland

3 votes

Source: <https://en.wikipedia.org/wiki/Jurmo>



Cape Town, South Africa

2 votes

Source: <http://www.capetown.travel/visitors/see-do/shopping/your-long-street-cheatsheet>



Damascus, Syria

2 votes

Source: <https://ferrelljenkins.blog/2008/09/26/saul-paul-in-damascus>



Helsinki, Finland

2 votes

Source: <https://www.deviantart.com/pajunen/art/Helsinki-streets-668031942>



New York, USA

2 votes

Source: <https://www.deviantart.com/pajunen/art/Helsinki-streets-668031942>



Sevilla, Spain

2 votes

Source: <https://lucybarclay.wordpress.com/2015/10/04/seville>



Weimar, Germany

2 votes

Source: <https://kacook17.wordpress.com/2013/10/16/weimar>



Abidjan, Ivory Coast

1 vote

Source: <https://en.wikivoyage.org/wiki/Abidjan>



Nairobi (slum), Kenya

0 votes

Source: http://www.nairobislums.org/woowsliders/slider_slums.html



Stone Town, Zanzibar

0 votes

Source: <https://www.youtube.com/watch?v=NNy7nS9x6C4> (Video still)



Ndungu, Tanzania

0 votes

Source: <https://meetjesusatuni.com/2014/04/24/starting-to-think-about-villages>



Task 2: Choose the image you like better of these 6 pairs of photographs.



ONE

Playing on a concrete city scape, Amos Rex museum in Helsinki, Finland – **8 votes**

Source:

Children playing on a meadow – **12 votes**

Source: <https://million-wallpapers.com/children-100-android>



TWO

Kijini Primary School students in Mnyuni, Zanzibar – **2 votes**

Source: <https://www.nationalgeographic.com.au/people/on-burkini-island-muslim-girls-can-finally-learn-to-swim.aspx>

Empty beach in Maldives – **18 votes**

Source: <https://wallimpex.com/maldives-beach-wallpapers.html>



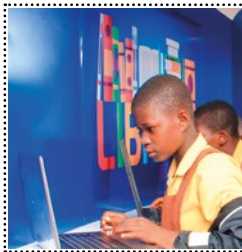
THREE

Outdoors indoor in the world's first biophilic gym in London, U.K. – **14 votes**

Source: <https://www.insidehook.com/nation/biofit-indoor-gym-outdoor-feel>

Boy climbing an oak tree – **6 votes**

Source: <https://i0.wp.com/conniestevenswrites.com/cstevens/wp-content/uploads/2015/01/kids-climbing-trees.jpg>



FOUR

Modern street library in Ghana – **14 votes**

Source: <http://www.vpwa.org/volunteer-projects/street-library-program/>

Library of Muyinga in Burundi – **6 votes**

Source: <https://clay-works.com/library-muyinga-bc-architects-studies/>



FIVE

Las Setas artificial shading in Sevilla, Spain (Source: Metropol Parasol Views) – **18 votes**

Source: <https://fi.pinterest.com/pin/383720830730627949/>

Natural shading in front of a library for children in Oaxaca, Mexico – **2 votes**

Source: <http://www.oaxaca.media/cultura/la-bs-refugio-de-las-letras/>



SIX

Street musicians in Campeche, Mexico – **6 votes**

Source: <https://www.dreamstime.com/mariachi-streets-colonial-campeche-city-mexico-image133441783>

Campeche historical centre in Mexico – **14 votes**

Source: <http://www.marieldeviaje.com/destinos/campeche-destino-2016/>



Task 3: Draw your path from school to home and mark something you specifically like with a blue sticker and something you do not like with a yellow sticker.

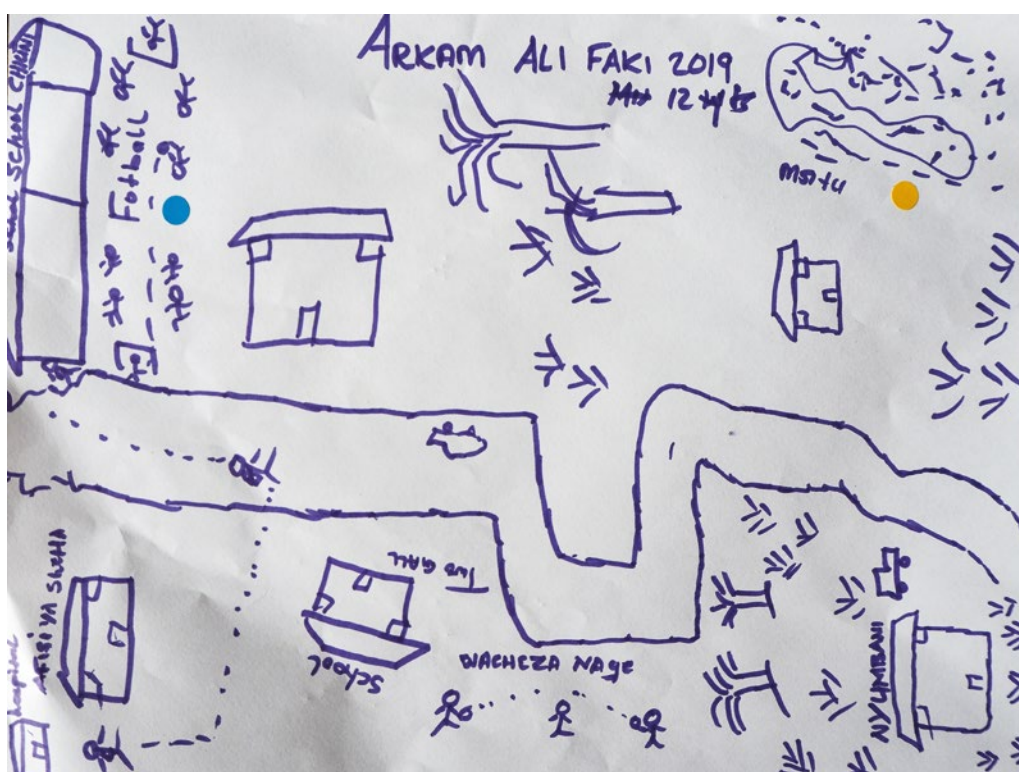
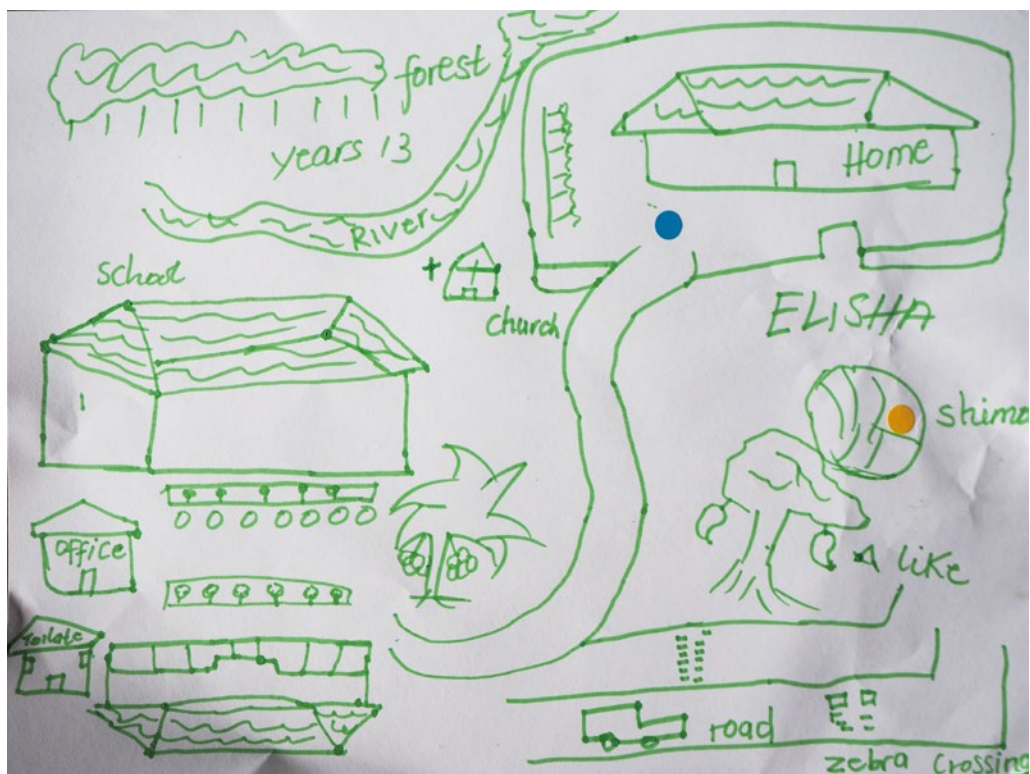
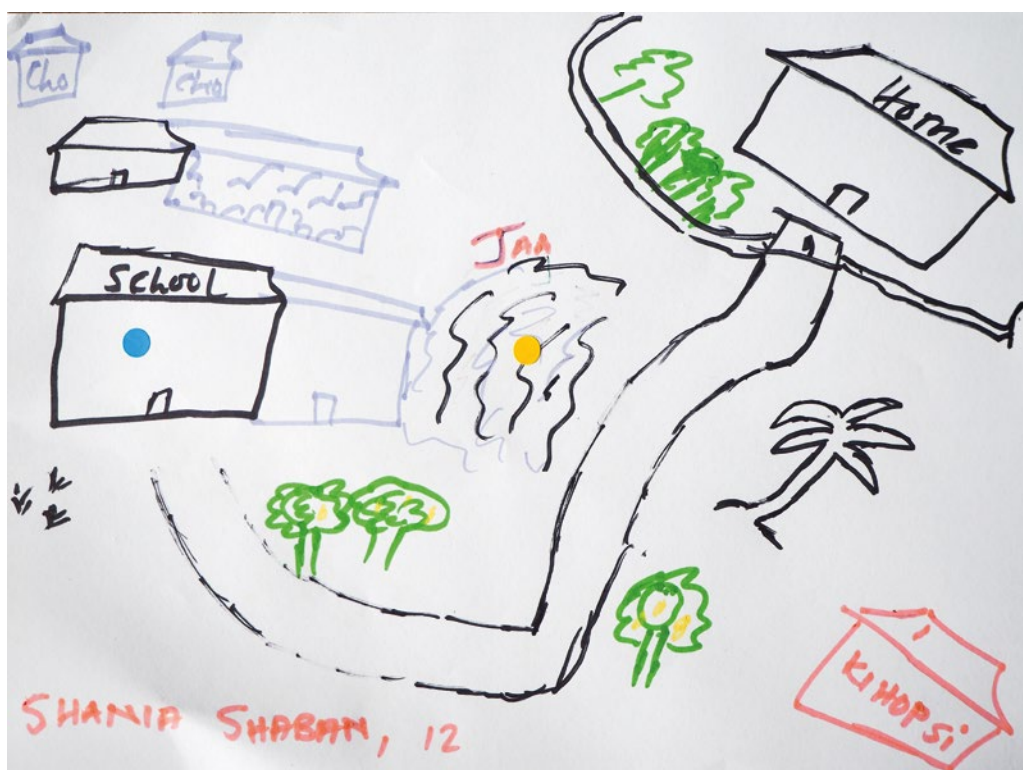




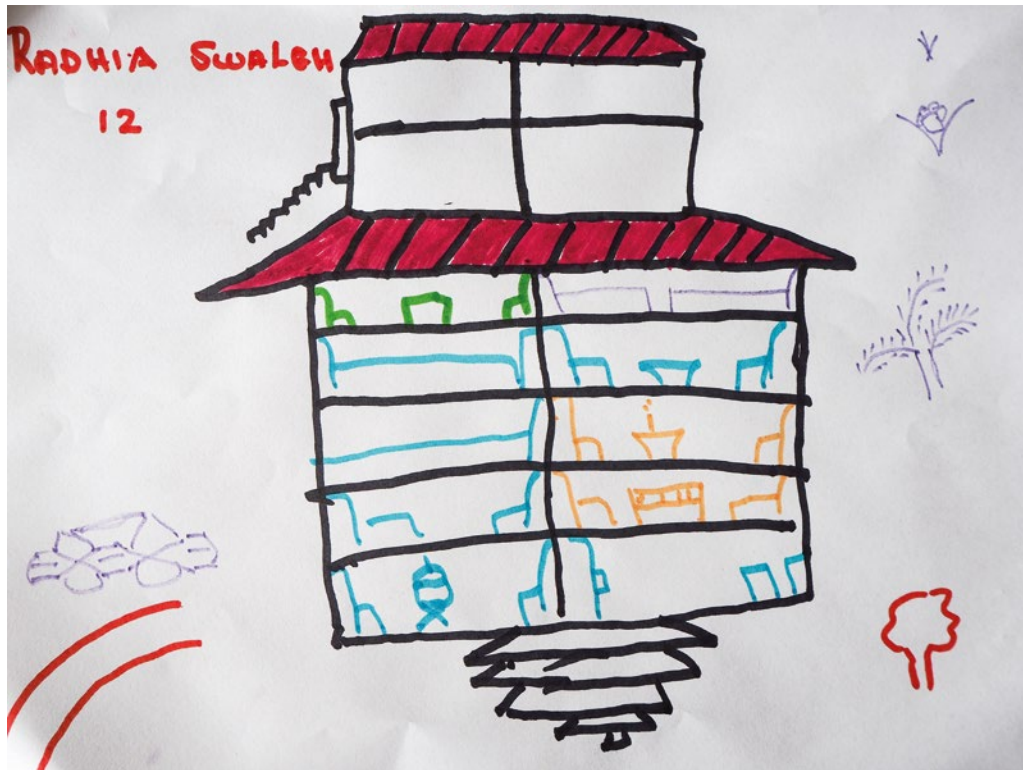
Photo: Belén German Blanco, 2019





Task 4: Draw your dream home.





Interview I

*Director of the West A Municipality***Amour Ali Mussa**

Unguja is divided in three regions: Urban/West Region (which is divided into three municipalities: West A, West B and Urban Municipality), and North Region and Central/South Region, both of which are divided in districts. Chuini falls under the jurisdiction of West A municipality in Urban/West Region. There are altogether 34 shehias in West A Municipality.

Municipality is responsible for the local governance and ensuring peace and security in the area. Education, agriculture, and healthcare are their primary responsibilities. There are 1228 people working in these aforementioned three fields and in the municipality office (84 people).

According to community consultation, people would like to have a market like in Darajani or Mwana Kwerekwe, but the municipality wants to develop a shopping mall with funding from the World Bank (with the PPP funding mechanism). The estimated cost of the construction is 2.5 billion TZS (approx. 1 million euros). To go further with the project, World Bank requires a site plan for the area.

There are around 400 dala dalas and trucks going through Chuini daily, so there is a real need to replace the existing informal dala dala stop with a proper bus terminal. The municipality is also planning a hospital especially for women and children to be located in Chuini.

According to the municipality director there is no flooding in Chuini, which is proven by the lack of certain plants and birds in the area. The director does not find agriculture in the area profitable anymore. Instead, he wants to offer the residents the opportunity to start their business in the shopping centre, which he thinks will offer them greater financial profit. People who lose their livelihood due to development in the area will be given priority when spots in the shopping centre will be distributed.

The municipality director found young people to be the biggest challenge in the development of Chuini, because they oppose development if it means they will lose their football field or have to walk further to play. The director feels that the shopping centre would give more possibilities for the young people as well. He also stressed that the area in question is governmental land, which means that no permanent activities should take place there, and the government has the right to take the area under its control when it needs it.

Interview II

Director of the Zanzibar Housing
Corporation

Riziki J. Salim



*"In real world you cannot have
affordable housing
using concrete."*

Housing Corporation was established in 2014. All their projects must be approved by the government, but they rely solely on rent revenue. There are 69 employees working for the Housing Corporation in Unguja and Pemba. The Corporation manages 1216 apartments.

The biggest challenges are acquisition of land and importing materials, because the taxes are high. Constructing multi-storey affordable housing is difficult, because materials for concrete are expensive and sand is a very limited resource, whose price has also risen significantly during the last years. Affordable housing is easiest, when it is one-storey, but there is not enough space in the city to respond to the urbanisation and population growth. During the rule of Karume in the 1960s, patriotism was strong: it was easy to find unpaid work force to participate in constructing the society – this is not the case anymore.

The Housing Corporation would like to have a piece of virgin land to relocate people from areas under development but claims that the DoURP does not want to allocate land for that. [The reason is that the DoURP think the Housing Corporation should accept the fact that they need to put their resources into densifying efforts, because there is no virgin land left.]

Average Zanzibari family today consists of parents and three children (quite often still more) and the extended family still often lives together. New apartments should be minimum two-bedroom apartments, plus living room, and kitchen. Master bedrooms are valued by people, but people's wishes are not in line with what they can afford. Kitchen is preferred to be a separate room with a connection to an outdoor space. Entrance is often straight to the living room without a specific space for leaving clothes or shoes.

According to the director, people do not mind living in multi-storey houses, although interviews have often shown otherwise. Some people definitely prefer living in a single-family one-storey house. People do not like sharing spaces or facilities due to cultural reasons and because they believe that a shared space would lack maintenance and mutual responsibility to keep it clean. Some outdoor spaces like a playground for children could be shared.

According to the director, affordable rent would be 250.000–300.000 TZS per month. However, we soon found out that it would probably require a middle-income job like that of an engineer (approx. 675.000 TZS per month). A truly affordable rent would be 50.000–60.000 TZS per month. Extra facilities like security and cleaning increase the rent.

Interview III

Director of Angoza (Association for Non-Governmental Organisations in Zanzibar)

Asha Aboud

*"We can't favour men
without favouring women."*



Angoza is an umbrella organisation for non-governmental organisations in Zanzibar, both Unguja and Pemba. It was founded in 1993 and it has over 240 member organisations which engage in different activities like women's or children's interests, human rights (especially people with disabilities), health (HIV/AIDS), environmental issues and policy issues. One of the Angoza member organisations works on climate change. They provide education and raise awareness in schools and communities. Many other organisations working on environmental issues tackle mostly waste related issues.

The aim of Angoza is to build capacity and share information with its members and to organise dialog between the organisations and government officials. International organisations in Zanzibar work independently of Angoza. Angoza is funded by donors, and it does not receive any funding from the government. The most important governmental support (besides funding) is a friendly environment, where NGOs are allowed to exist and carry out their activities.

Currently the organisations do not have enough space. And if there is no place to work, it is difficult to work comfortably and efficiently. Both Angoza and its members have requested land to build office spaces for their activities but have not been granted any. Angoza provides a website for its members to advertise their work and sell their products like handcrafts, but many also advocate their agricultural produce.

Accessibility is a big and unaddressed issue in urban space in Zanzibar. It is very hazardous for people with limited eyesight to move about in the city, because the traffic is so chaotic. The needs of women, children and disabled people need to be considered in urban planning. There are not many mosques that allow women to come in and pray. Most women pray at home but would like to be able to pray also elsewhere. Street lighting is also an important element in the city to make women feel safer during dark hours.

Concerning housing, the director said that any individual or organisation willing to construct a house in Zanzibar has to follow a strategy for accessibility for people with disabilities. According to a survey Angoza had made, majority of people in the urban area do not know how to acquire land through a legal process. That is why most of them grab land and construct their home there illegally.

Public toilets should be arranged so that men and women have their own separate toilets and entrances are better opposite each other than next to each other. Public toilets need to be accessible

to all, including people with disabilities. To improve safety, it is good to have attendant working at the location, to also take care of cleaning the facilities and taking payments.

Religious leaders can be very powerful in influencing people and delivering information, if they agree with the agenda of the NGO actors. This is very important in sexual education, because using birth control is still considered sinful by many Muslims. If an imam says it is not a sin, but may help prevent spreading serious diseases, it makes a huge difference.

Interview IV

Reclaiming Women's Space

Munira Said

"There is a lot of lost space where women used to spend time."



Photo: Peshia Magid, 2018.

Reclaiming Women's Space is an association, which aims at civil society participation and heritage conservation. They wish to mobilise women, offer skill training, and help women see how they can realise their passion.

In Muslim culture, men and women are traditionally separated in space. In Stone Town, there used to be plenty of spaces exclusively for women, like a specific area on the beach, but now they are lost, mainly due to tourism taking up more and more space in the city. By using methods of storytelling and memory mapping, these spaces can be recognised and possibly reclaimed.

Interaction between genders is not prohibited by religion, but many prefer spending time with their own gender, nevertheless. It is what people are used to. On the issue of mosques that would allow women to enter for prayers, the interviewee said that it is an advantage for women to pray at home, because they have so many domestic responsibilities.

Photo by Magid, P., 2018. *Munira Said of Reclaim Women's Space*. [Image online] Available at: <https://www.theguardian.com/cities/2018/oct/11/tourism-pushed-women-out-of-zanzibars-public-spaces-but-now-theyre-taking-them-back> [Accessed 10 April 2019].

Interview V

Director of Zanzibar Water Authority
ZAWA

Muhammed Ilyasa Muhammed

*"Water is life. Houses and water
sources are enemies."*



ZAWA is mandated to carry out all water supply and water resource management issues in Zanzibar, both Unguja and Pemba. They do not tackle sewerage issues, unless it is part of a project, when sanitation is also addressed. They are responsible for water transmission and distribution pipelines and drilling bore holes.

Green areas are crucial in maintaining the aquifers in Zanzibar. Basins and wetlands harvest rain water and recharge the groundwater sources. The ponds pose a risk of spreading diseases like cholera. Sand layers will filter most of the contamination that stems from the surface, but chemicals pose a serious problem. According to a 1994 study, the groundwater supply in Zanzibar should have been enough up to 2015. There is no more recent study on the issue.

Due to climate change, rainy seasons have become drier, intensity of rains and the amount of rainy days has decreased. Maximum temperatures are getting hotter. There is a strong connection between agriculture and rain water. Irrigation is always needed during the dry seasons (source is either streams or groundwater). Rain water harvesting is one solution to water scarcity.

Hotels consume a lot of water and emptying a well increases the risk of salinization. Sometimes they also use the community wells. All hotels are required to recycle their water. There are no waste water treatment plants in Zanzibar, and water is treated with only chloride to eliminate most of the bacteria. Indians are funding a treatment plant project. Chlorinated groundwater is currently used for flush toilets. Seawater cannot be used, because it would rust the pipes. Water is a necessity in toilets for Muslims; dry toilets are not an option, but solutions to reduce water usage should be studied. Septic tanks are currently needed, because there is no central sewerage system. However, the director called septic tanks "misuse of space" that could be used for something else.

Water sources need to be protected and the surroundings need to be paved with permeable materials or planted with greenery. Ideally there would be a 100-metre radius of buffer zone around each water source, but many exceptions are made on that, and in reality it ranges between 20–50 metres. Upstreams and downstreams are important to consider in planning. Housing should be located lower than the water source, whenever possible.

Bore holes are drilled up to 100 metres down, but sometimes the water gets salinized in the deepest holes. Groundwater is often found at 4–5 metres below ground. In Chuini area there is only one borehole in use at the moment. There are some other holes that currently stand idle, and will be taken into use, if necessary. A buffer zone should be left around each bore hole.

Interview VI

Director General of ZEMA and Director of DoE

Sheha M. Juma & Farhat M. Mbarouk

"We need to avoid any social and environmental hazards created by new development."



Photo: CSE, 2017

ZEMA and DoE are responsible for environmental monitoring, environmental impact assessment (EIA) of proposed development, dealing with climate change issues and delivering environmental education and research. There are no general guidelines from environmental point of view, but an EIA should be carried out at an early stage of each project. Along the coastline, there is a 30-metre buffer zone which prohibits development in that area.

Being on an island means limited resources, and non-renewable natural resources are running out (lack of sand is one of the most pressing issues). There are no pilot projects on sustainable new building materials. Hollow building bricks have been seen as one option to decrease usage of raw materials. There is no capacity to go vertical, so urban sprawl happens horizontally. 70% of urban areas are informal settlements. Apartments need to be big enough, 2–3-bedroom apartments are not designed to host extended families.

Water supply is an issue. Surface water flows into the ocean and does not recharge the groundwater sources. Other times it gathers in problematic areas due to informal settlements, which causes flooding. 80% of flooding issues will be solved through proper drainage. Informal settlements also cause a threat to water catchment areas.

Sea level rise causes both saltwater intrusion and inundation in Zanzibar. In some areas people have had to be relocated, because agricultural land has deteriorated so badly. Overpumping water supplies may also lead to salinization of groundwater sources.

Both terrestrial and marine biodiversity is diminishing due to exploitation of natural resources, which destroys natural habitats. The level of deforestation is also alarming due to wood being used as the primary (90%) source of household fuel. As much greenery as possible should be preserved.

Solid waste management is poorly infrastructured. Legally local government authorities (like the West A municipality) are responsible to collect waste but only 15% of solid waste is being collected and there is no sorting. In Stone Town there is door to door waste collection, but elsewhere it is based on collection points, from where the waste is taken to a landfill. The disposal of waste in Zanzibar is currently not environmentally friendly.

There is a pilot project for composting in four areas, where the sorting is started in the households. Biodegradable waste is taken to make compost and the rest ends up in landfill. Composting is also an income generating activity.

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The littering stems from attitude and lack of education. There are new regulations under preparation to start fining for littering. The same has taken place in Dar es Salaam and they have been very effective. The process will start in Urban municipality. There is a need for a big publicity campaign.

Hazardous substances like medical and electrical waste cause an environmental risk. Tourism brings income and employment, but also creates a vast amount of waste. Climate change is already causing problems.

Photo by CSE, Centre for Science and Environment, 2017. *Stakeholder Meeting: Replicating the Shaurimoyo pilot in other municipal councils of Zanzibar*. [Image online] Available at: <https://www.cseindia.org/stakeholder-meeting-on-replication-of-shaurimoyo-decentralised-waste-management-pilot-in-other-municipal-councils-of-zanzibar-8546> [Accessed 10 April 2019].

Interview VII

Director of the Department of Urban and Rural Planning, Zanzibar

Dr. Muhammad Juma Muhammad

"I think we are capable of more than we are currently doing."



What are currently the main focus areas of the Department of Rural and Urban Planning?

There is no singular point of focus, but three at the same time. First is the vision, which is very important. It is about where we want to be in 30 years and taking care that we are going to that direction. Secondly, people have needs, like a need for housing, and we have to respond to those needs. This is the day-to-day work: planning small plots to answer to urgent needs. Thirdly, capacity is needed to carry out the 30-year-vision and the day-to-day work. There are currently mostly diploma engineers doing urban design. There is no luxury of having people who know what they are doing, but they need to be taught and guided. Skill derives from education, and practice enhances that skill.

How many people are currently working at the DoURP?

There is administrative staff, professionals in e.g. law and documentation, and 6–7 people in planning, only 2 of them architects.

What is your vision for the future of Chuini?

Chuini is part of the overall vision, which is to make Zanzibar the most sustainable city. Zanzibar is a small city compared to many other cities in Africa, but sustainability is another thing. I want to concentrate on quality, because by nature we cannot have quantity. I would like people to come to Zanzibar to enjoy the quality of the city. Sustainability in Zanzibar is taking care of the environment and the climate change and then adding quality and preserving the culture.

What would be the most important elements to preserve in the development of Chuini?

Environment comes first: there are wetlands, rivers and big trees that have to remain. Chuini could offer something that is nowhere else; the environment has to remain. There should be public spaces and it should feel good to go outside. People could learn to appreciate nature in the environment of Chuini. Chuini should keep its own character when it becomes a new centre. Closeness to the sea is one such characteristic.

How is flooding taken into account in the urban planning of Zanzibar City?

Flooding has been an issue for the past five years — before that there was not that much flooding because there was not that much urbanisation, water had its natural ways to escape to the ocean. There were lots of natural streams that took the water to the sea. Now, housing and roads create new artificial currents of water. In Pemba, landslides have become a new problem. People have chopped hills and cut down trees for materials, which has reduced the resistance of the hills causing landslides.

We go again to the issue of proper planning and a proper way of constructing. Due to urban sprawl, the government is obliged to plan in areas that could otherwise have been left as forest. Every individual is doing in their own way, so the question is how to plan with resilience?

How is the consultation between different authorities working in Zanzibar?

So far there has not been very much cooperation, besides the cooperation with the Department of Environment. With the other authorities, it is usually 80% one-way communication: we go to them but they don't come to us. There is a problem of organisation, and it is not clear how cities are managed. The municipality does not have an overall control over planning, and there is a lack of sectoral coordination. As the responsible for urban planning, I have no alternative but to talk to them.

How could we turn urban sprawl into more controlled urban development?

I would call the informal settlements in Zanzibar City semi-informal settlements, because there is some sort of coordination. Even though there is no official plan for the areas and the people don't own the land, the local people are organising the planning and construction of the areas.

To be able to create a strategy to control urban development, the government has to understand that the sprawl is a threat. People build houses, because they need shelter, so the government has to provide the people with housing and planning and shelter. Urban sprawl is a very big challenge to sustainability, the biggest challenge right now. There are also the economic challenges: people cannot afford buying a house, so there is an urgent need for social housing. However, with the current economy there are no means, we are already struggling with financing schools and hospitals.

The government should take very difficult and strong decisions. There is a need for a 20-year programme. Singapore was in the same situation as us in the 50s, and the government decided to demolish and rebuild big parts of the city. The Michenzani blocks in Zanzibar City can be debated from the architectural and urban planning points of view, but philosophically it was the right thing to do [to offer affordable housing to the people]. We can build one block every year, but we are not doing it. I think we are capable of more than we are currently doing.

I will not miss being unable to escape the constant sweat and the constant noise.

I will miss dipping my feet in the ocean and listening to the whistling bird at breakfast.

*I will not miss the omnipresent rubbish,
but I will miss the beautiful landscapes beneath and beyond it.*

*I will not miss the never ceasing offers to buy something,
but I will miss all the jambos from the children looking at me with curious eyes.*

*I will not miss people being late for meetings,
but I will forever be grateful for the insights they shared with me.*

*I will miss the narrow alleyways in Stone Town
and all the surprises behind each corner in Ng'ambo.*

*I will miss the palm trees in the lushness of Chuini
and the turquoise of the ocean.*

I will miss all the fresh fruit and daily coconuts.

I will miss the soft golden light just before sunset.

*I am thankful for the experience,
being invited and welcomed into this utterly different world.*

asante sana



“The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide.”

— Sir Robert Watson, IPBES Chair

In the face of a global environmental crisis caused by uncontrolled population growth, urbanisation, and reckless utilisation of natural resources, humanity is encountering unprecedented challenges. We need to find a way to live on this planet of limited resources if we wish to ensure the survival of our species. Our current endeavours chip away at the very basis of life on Earth. Sustainable development has been proposed as the answer to this problem, but it does not seem to be working. How should it be defined to actually lead a sustainable life on this planet? What must be done to achieve true global sustainability and what is the role of resilience in this equation? How can urban design and planning be utilised to reach this goal?

In hopes of answering these questions, this master's thesis in architecture studies urban design and planning as tools to improve resilience, and resilience as key to achieving sustainability. The theoretical part is illustrated in practice through a case study done in Zanzibar, Tanzania.